VOLUME XLVIII NUMBER FOUR

THE NATIONAL GEOGRAPHIC MAGAZINE

OCTOBER, 1925

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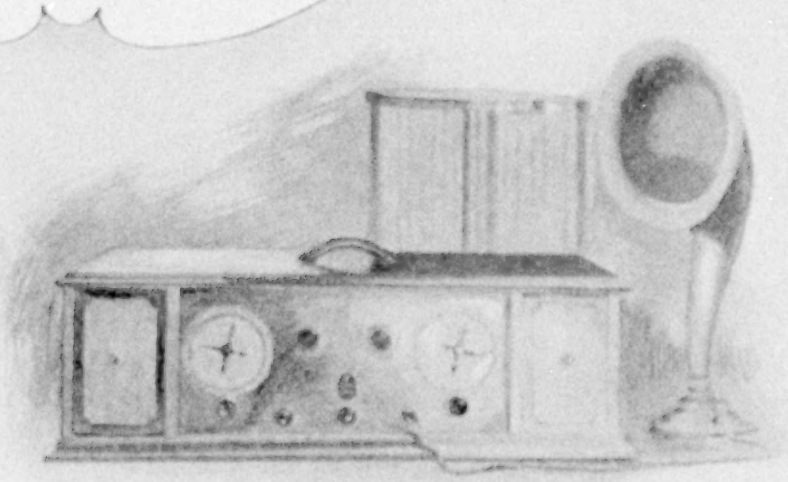

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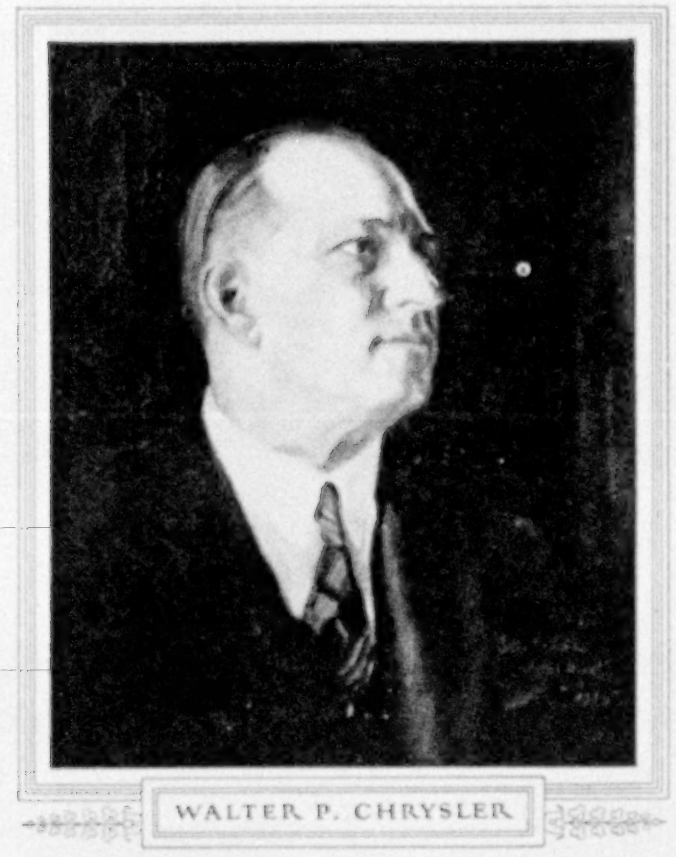

WALTER P. CHRYSLER

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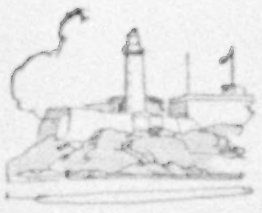

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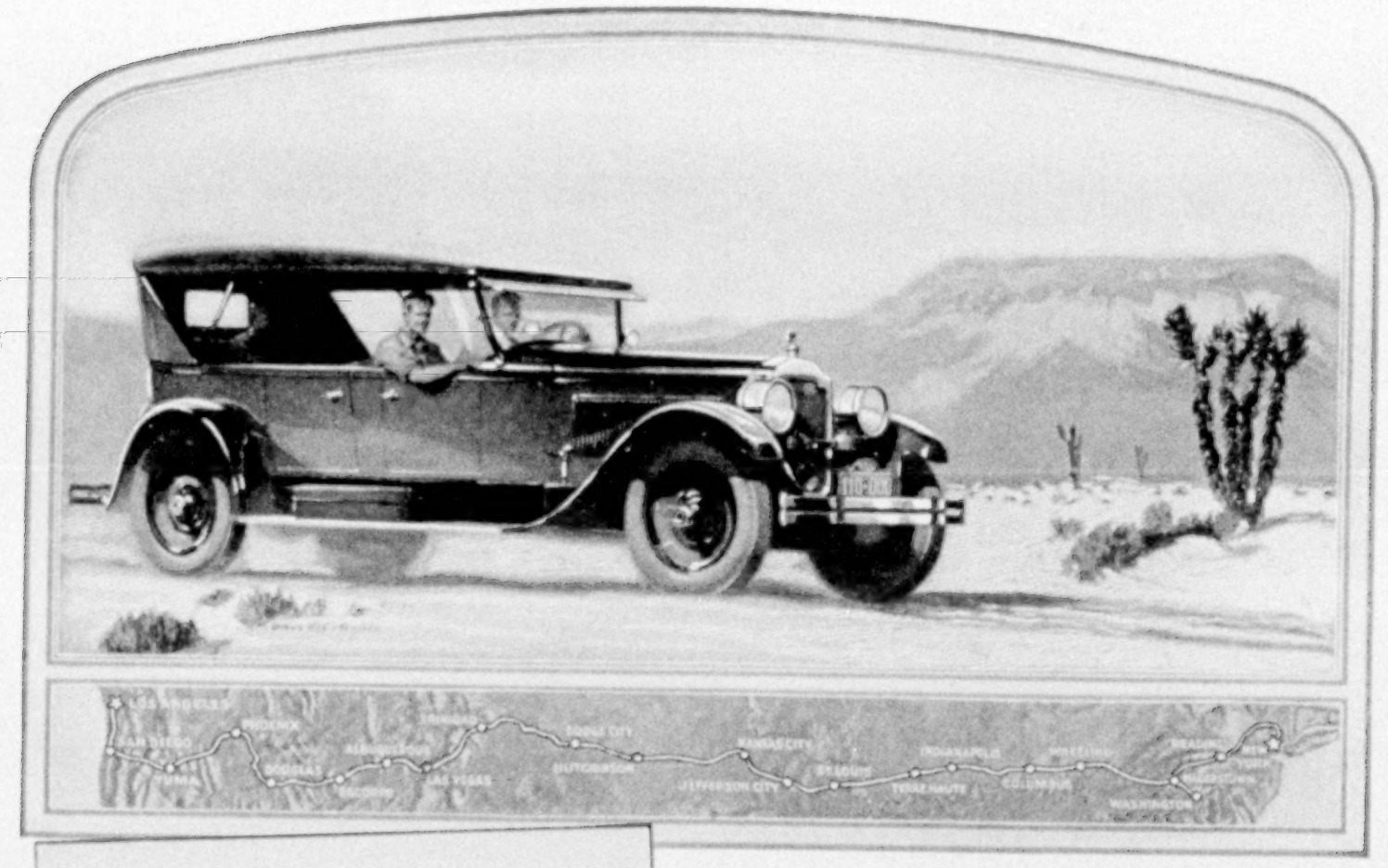

—from Lieutenant Wade's
Letter to Alvan Macauley, President
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Leigh Wade

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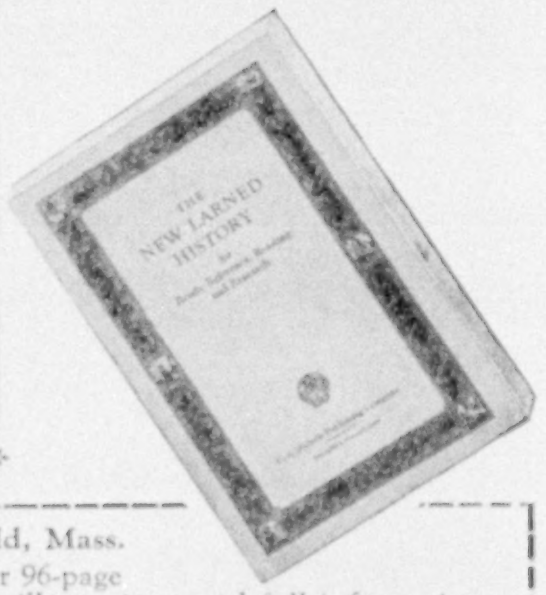

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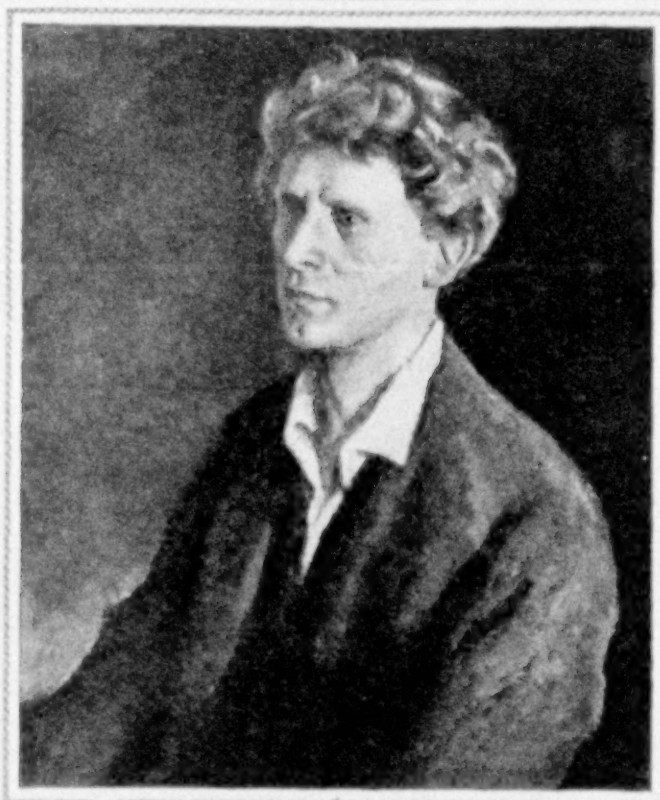

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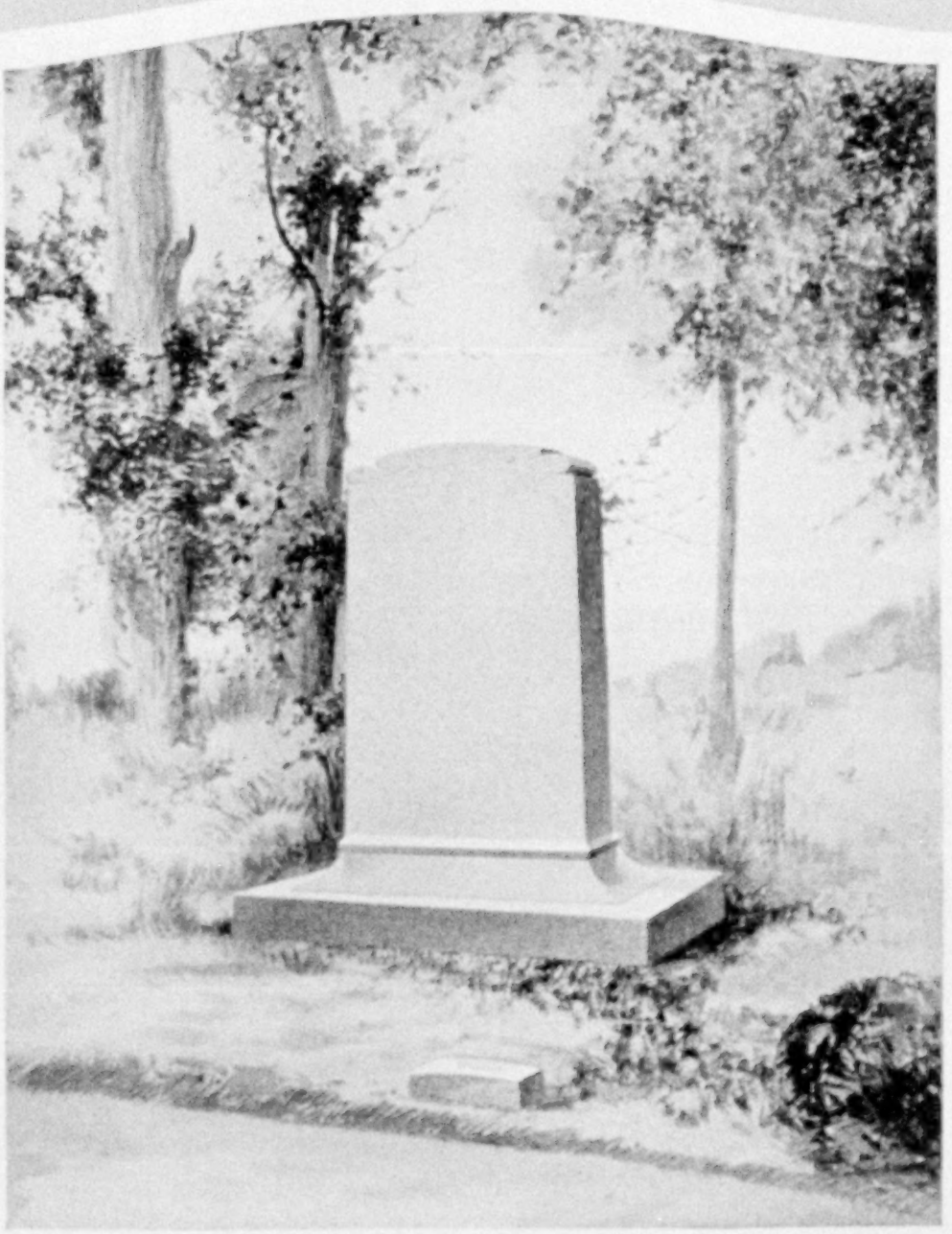

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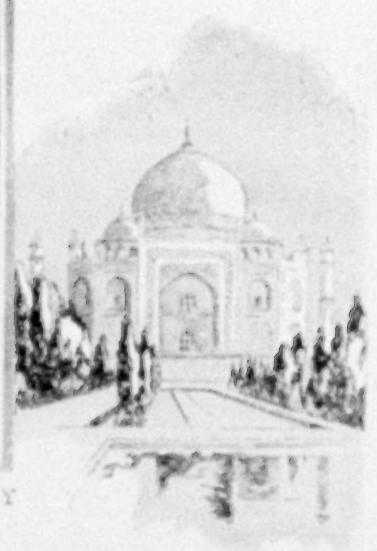

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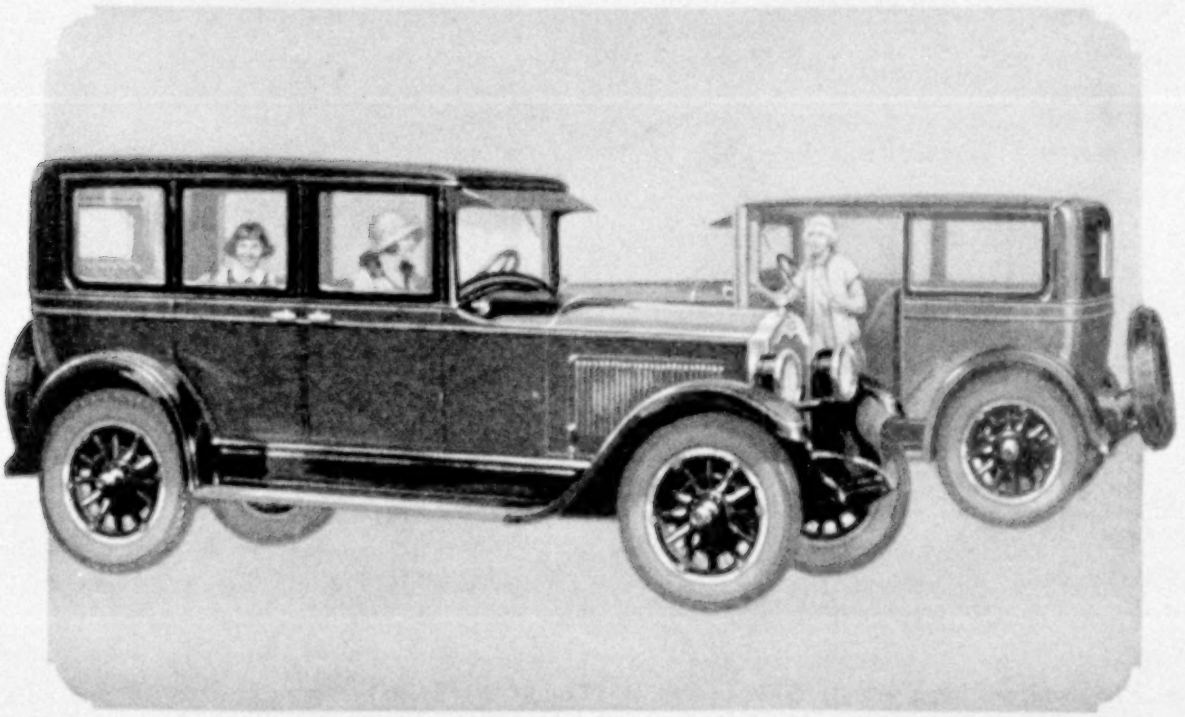

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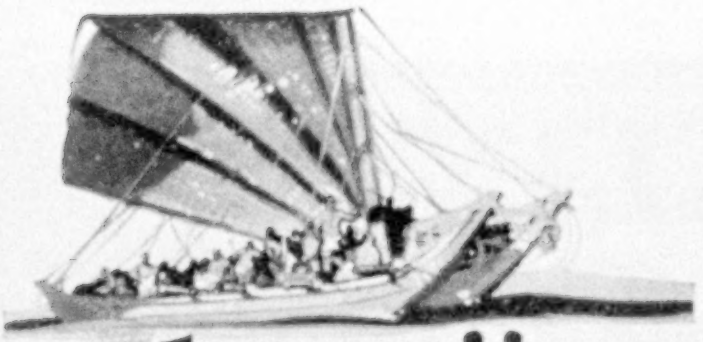

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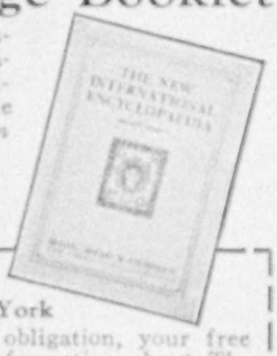

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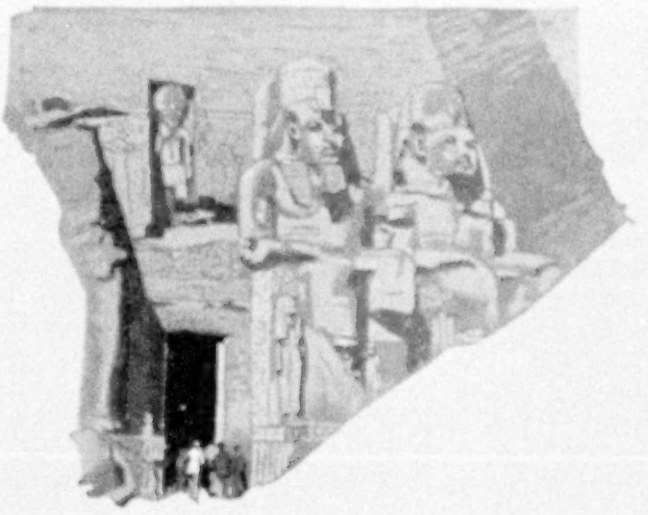

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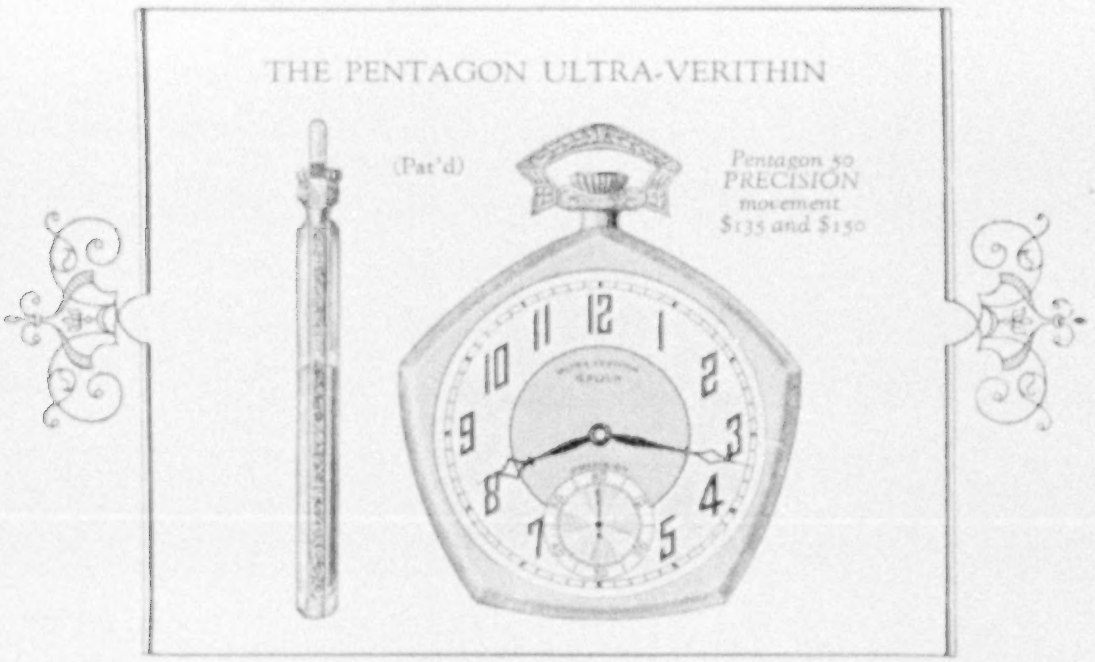

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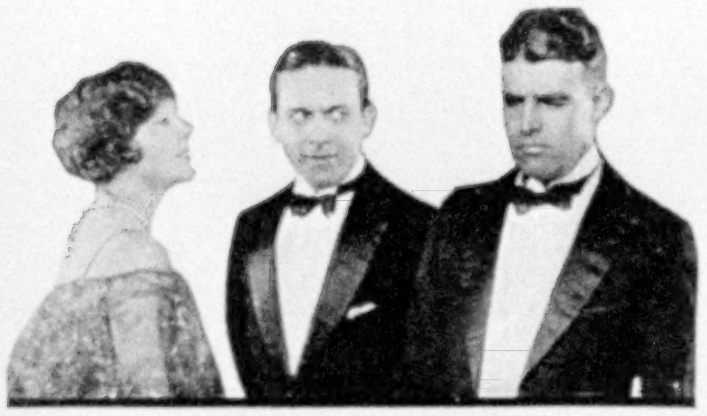

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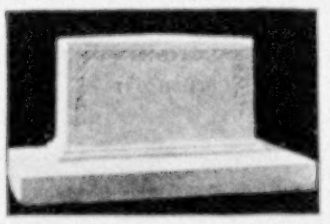

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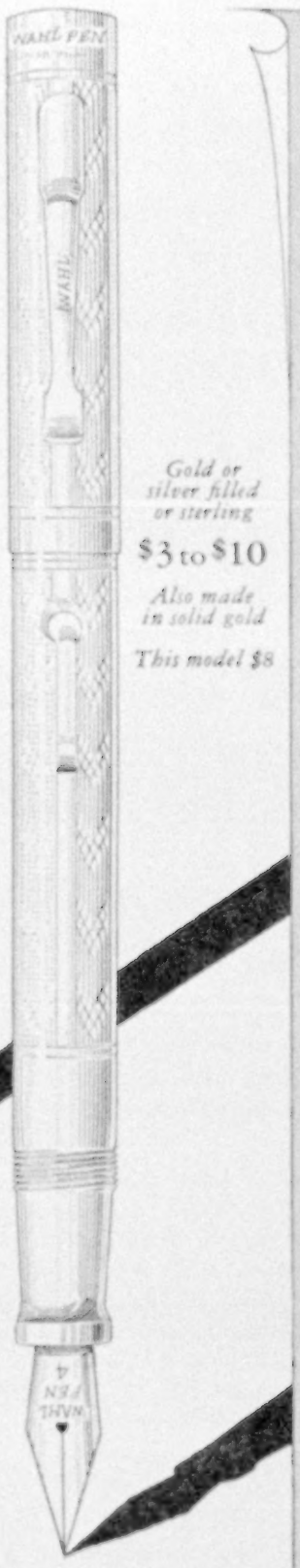

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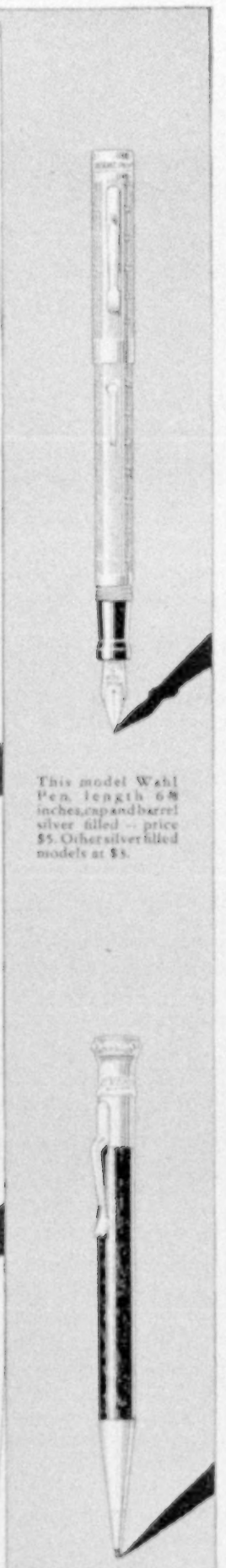

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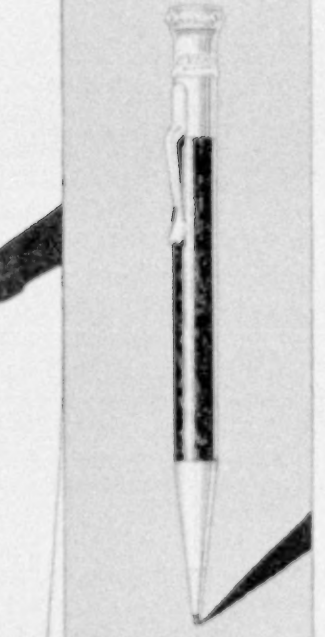

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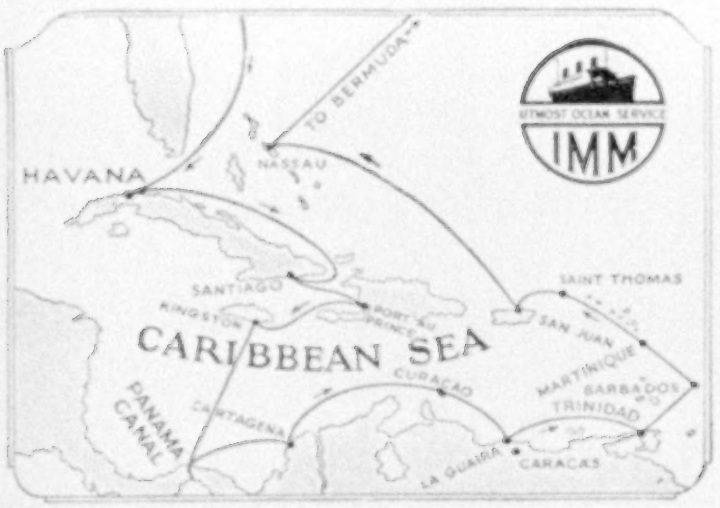

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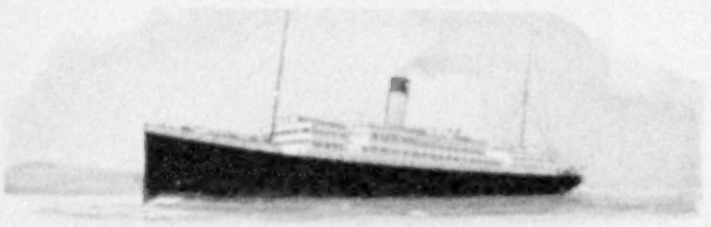

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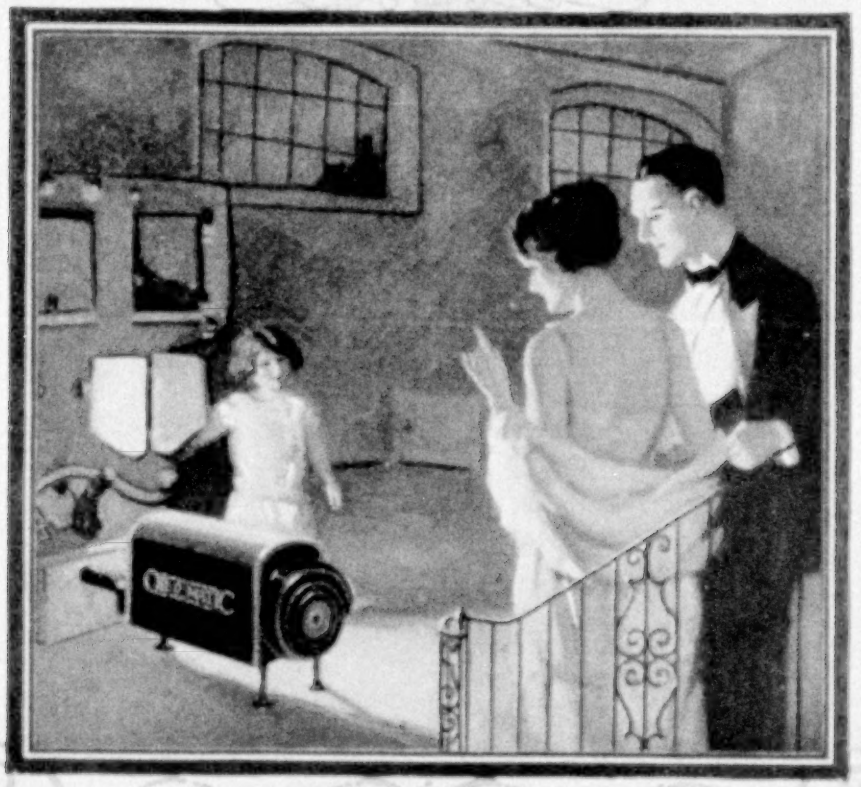

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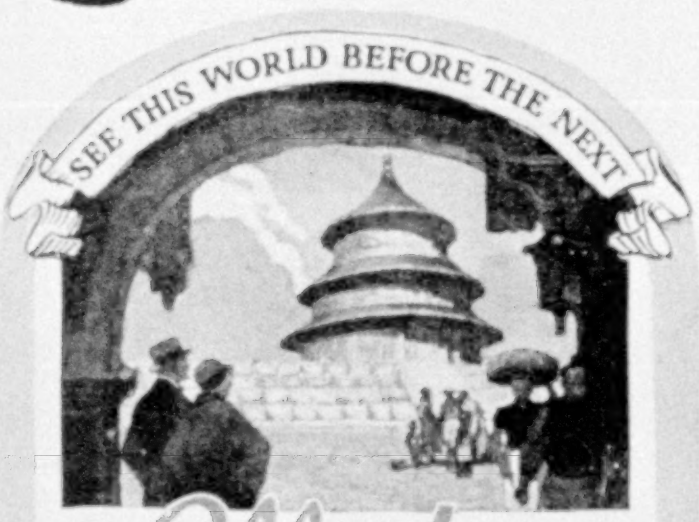

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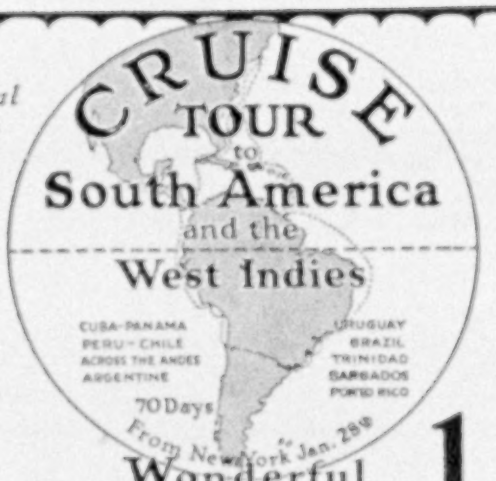

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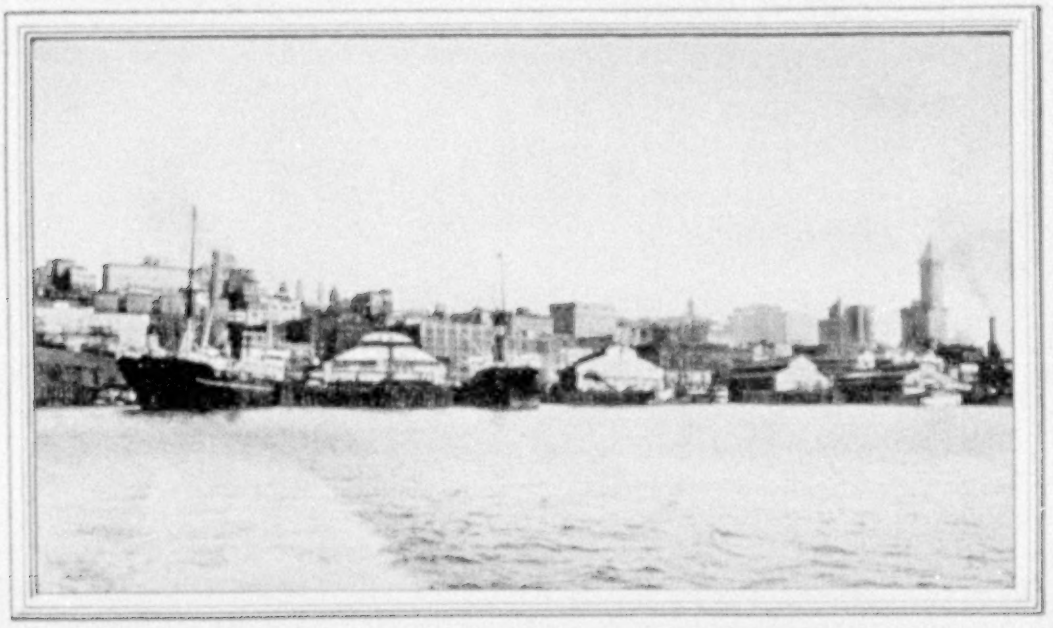

From two to ten days nearer the Orient, the great, modern ports of Washington and Oregon occupy a strategic position in our fast growing trade with the Far East

Pacific Coast leadership centers HERE

On our Pacific Coast the ports of the Pacific Northwest lead in foreign trade by a substantial margin, according to figures of the Department of Commerce.

This is shown by the total value of imports and exports and also by the total net tonnage of vessels entered and cleared, as reported by that Department.

This leadership of the Pacific Northwest has been built upon certain definite, natural trade advantages:

The ports of Washington and Oregon are nearer by several days' sailing to the Orient. That is why 80 per cent of the trans-Pacific mail is handled through the Seattle post office. That is why 70 per cent or more of the raw silk now enters the United States through the Pacific Northwest.

Savings in time, interest and insurance charges, so strikingly shown in the case of raw silk, are also effected in other commodities. Shippers recognize the Pacific Northwest as the fast and economical route for shipments to the Orient.

Pacific Northwest ports are also nearer by rail to the Atlantic seaboard. They are the doorway to Alaska. And they are endowed with harbor facilities that are unsurpassed.

Time can only emphasize these advantages. Nature and "the immutable law of the short haul" have established the dominance of the Pacific Northwest ports in the great and growing commerce of the Pacific Seas—today and in the future.

The Chicago Burlington & Quincy R.R.
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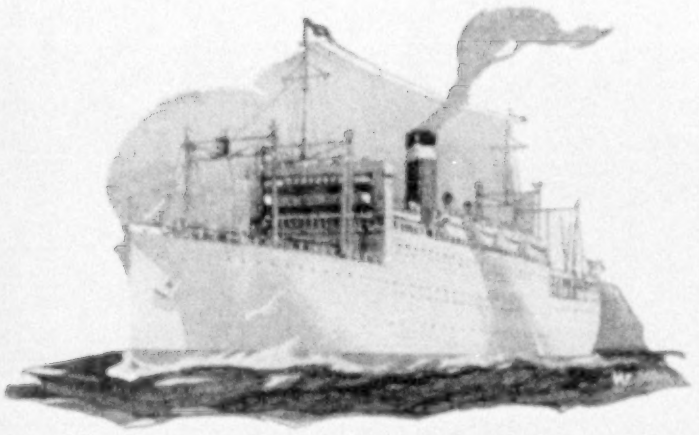

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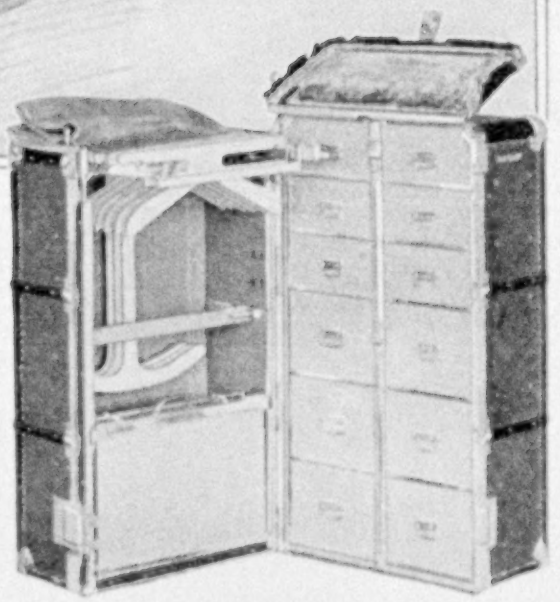

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AT first glance, wardrobe trunks, like people, look much alike. But—again like people—when we take a second glance we find decided differences. There is in the Hartmann Wardrobe Trunk that subtle air of distinction we are always looking for but seldom find. It's born of forty-eight years in the business—and the Hartmann signature on every Hartmann trunk. Sold only by dealers who believe in unusual quality at usual prices.

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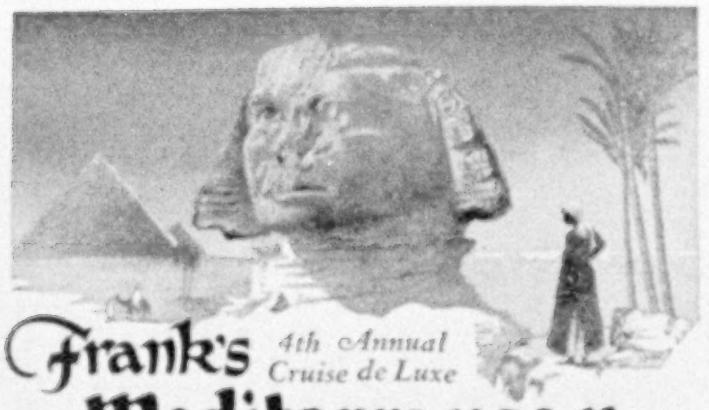

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The Cruise of the "Scythia" has become an annual classic. In every respect it is unsurpassed.

The "Scythia" is a floating palace, with spacious decks, lounges, veranda cafes, 2 elevators, gymnasium, commodious staterooms with running water and large wardrobes; bedrooms and suites with private baths. The famous Cunard cuisine and service. (Only one sitting for meals.)

Stop-over privilege in Europe without extra cost, returning via S. S. "Aquitania," "Mauretania," "Berengaria," or any Cunard Line Steamer.

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Delicious meals are appetizingly served in beautiful new-type dining cars on the

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—commandingly first in favor with travelers through the Northwest. An interesting new way to and from the Pacific Northwest and California. De luxe equipment and service—no extra fare.

From Chicago, via Burlington-Great Northern, daily 11 p. m. From Seattle daily 8 p. m.

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Finest Train to and from Pacific Northwest—No Extra Fare

Money's Red Flag

TO the office of a big insurance company come pathetic stories of money lost in speculation and unwise investments. Dismayed men and women, when it is too late, tell their experiences of funds provided by life insurance or saved by thrift, lost in wild-cat schemes promising great returns, sunk in "sure thing" tips from well-meaning friends and relatives, or frittered away in stock speculation.

The pity of it is that the hardest blows often fall on those least able to bear them—on men past the age of self-support, on women with no business experience, on young people trying to get a start in the world.

The Eternal Temptation

Over and over again one hears, "Surely there must be some way that I can get more than 6% on my money with safety. I am promised—practically guaranteed—that a certain stock will pay 10% or more and probably double in value. Only a few people know about this. A friend has just told me and says I must act quickly or lose the chance. Shall I invest?" The answer, in most cases, is "NO—that is not an investment, it is a speculation."

Records show that in all lines of business, the majority of new enterprises fail. And in the purely speculative ventures the losses are appalling.

DOLLAR PIRATES!

"The first thing to do, Blackie, is to look at the map and pick out a town where smart people have money in banks. Somewhere in this big United States people have been saving up coin for years, just waiting for us to come and get it."

So said J. Rufus (Get-Rich-Quick) Wallingford, smiling and engaging character from the pen of the late George Randolph Chester. So true to life—his counterparts are to be found the world over. Bold in the open and cunning behind cover, they plunder alike the simple, the greedy, the rich and the poor.

According to Postmaster General New, the people of this country are robbed of more than $1,000,000,000 a year in mail-fraud schemes alone! How much more is lost through other frauds cannot be estimated.

Don't let a Wallingford get your savings!

There is a definite danger line in investing money—and that line is located today at about 6%. This does not mean that everything below 6% is sound, nor that everything above is speculative, but—Money's Red Flag of warning appears at this level. Remember—"the higher the rate the greater the risk." Remember also that those who have but little money can least afford to take chances.

Investing is a Profession

Investing money is a highly specialized profession. None but experts know the comparative and ever changing values of various investments. Safe investments cannot be made on memory of *past* values.

Go to a bank and ask to be directed to the best man to advise you about investment. You will find yourself welcome even though you have only a small amount to invest.

The banker of today will try to protect you against fraudulent investments because general prosperity, which includes yours, helps the bank's prosperity.

The United States Government is trying to put out of business and put in jail all investment crooks and especially those who prey upon persons of small means—who can least afford to lose their money. Whenever you receive circulars or pamphlets or letters offering to make you rich over night, turn them over to the Post Office Department so that the Government may investigate, and, if necessary, prosecute.

Better Business Bureaus of various cities, bankers associations, national associations of manufacturers and other groups are issuing warnings against fake stock promotors. Many organizations are joining hands to prevent the stealing of billions of dollars by these financial tricksters.

Many of the foremost manufacturing plants are trying to protect their workers by issuing warnings in pay envelopes and on Bulletin Boards. Suggestions for notices will be mailed on request to interested executives.

The Metropolitan Life Insurance Company will neither criticize nor advise as to any particular investment but will be glad to mail free a booklet, "How to Invest Your Money" dealing with the general problem of investing which may aid you to avoid financial pitfalls. Send for it.

HALEY FISKE, *President.*

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Dressed up for Hallowe'en

A special holiday wrapper on the favorite

Fussy Chocolates

The Fussy Package is a welcome gift at any time. Especially good for Hallowe'en because of its treasures of nuts. Is now furnished in a colorful pictured wrap, to make it exactly fit the occasion.

Probably the first special assortment of chocolates to cater to individual taste of "fastidious folks," the Fussy Package is one of the older members of Whitman's "Quality Group."

It was made for those who prefer firm and "chew-y" chocolates. Nuts, nut caramels and nut nougat, hidden in a heavy coating of that delicious Whitman's vanilla chocolate.

Look for the Fussy Package, with or without the special Hallowe'en wrap, in those selected stores, in almost every neighborhood in the land, that are agencies for Whitman's.

STEPHEN F. WHITMAN & SON, Inc.,
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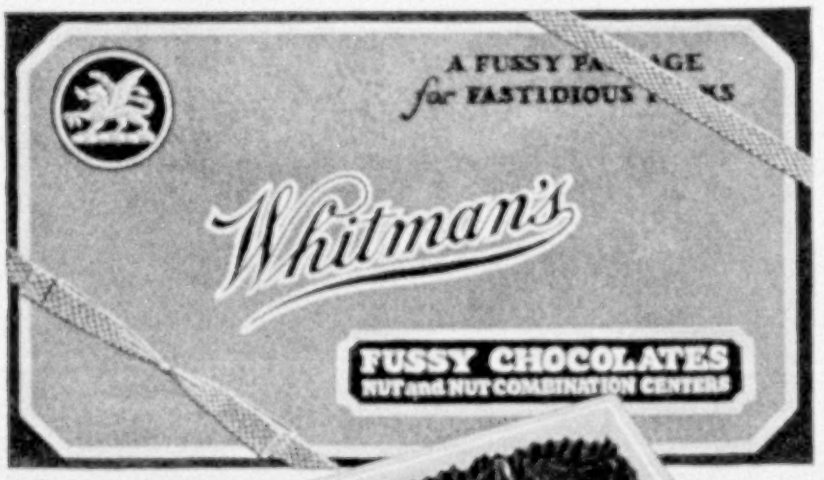

The Fussy Package contains chocolate pieces enclosing Almonds, Walnuts, Filberts, Peanuts, Brazil Nuts, Pecans, Double Walnuts, Pecan Caramels, Triple Almonds, Nougat, Nut Bricklets, Nut Brittle, Almond Dates, Double Peanuts, Nougat Caramels, and Almond Caramels. Packed in boxes from half pound to three pounds.

VOL. XLVIII, No. 4 WASHINGTON OCTOBER, 1925

THE NATIONAL GEOGRAPHIC MAGAZINE

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THE ROMANCE OF SCIENCE IN POLYNESIA

An Account of Five Years of Cruising Among the South Sea Islands

By ROBERT CUSHMAN MURPHY

AUTHOR OF "SOUTH GEORGIA, AN OUTPOST OF THE ANTARCTIC," AND "THE MOST VALUABLE BIRD IN THE WORLD," IN THE NATIONAL GEOGRAPHIC MAGAZINE

With Illustrations from Photographs by Rollo H. Beck

TO numberless readers the flood of books and articles by war-weary sojourners in the southern Pacific has meant the discovery of a new literary field—one in which heavenly isles, green with the breadfruit and the hibiscus tree, ringed by sapphire lagoons and dancing surf, are the setting for the lives of languorous natives who retain the pristine charm of Adam and Eve.

Looking at the subject with a historic eye, however, it is illuminating to note that from the days of the early discoverers the lands and peoples of the Polynesian archipelagoes have periodically claimed the attention and excited the imagination of civilized mankind. The present tide of favor is only a recurrence, such as has taken place about once in every generation since 1760 or earlier.

In the beginning, the vital narratives of the great voyagers of the eighteenth century, such as James Cook in Britain and Bougainville in France, were read by practically all educated men of their day. That they exerted a profound effect is reflected in the prose, the poetry, the humane and religious zeal, the developing wanderlust, and even the social customs of the period.

About forty years after the death of Cook, or in the twenties of the nineteenth century, the activities of British nonconformist missionaries in the Society Islands, as described in William Ellis's "Polynesian Researches," once again focused the eyes of the world upon the ever-fascinating South Seas.

MELVILLE REVEALS CHARMS OF THE MARQUESANS IN "TYPEE"

Ellis's studies, one volume of which is a classic source book for first-hand records of Polynesian history, traits, and culture, passed through several editions. The memory of them had hardly faded, even from the popular mind, before the original "cannibal island thriller" appeared, in the form of Herman Melville's "Typee" (1846).

This work, which has recently shared in the general Melville revival, is a Yankee whaleman's simple, personal account of four months' captivity among the then uncontaminated savages of the Marquesas Islands, the same people whom Captain Cook had long before called the finest race in the Pacific, for fair form and regular features "perhaps surpassing all other nations."

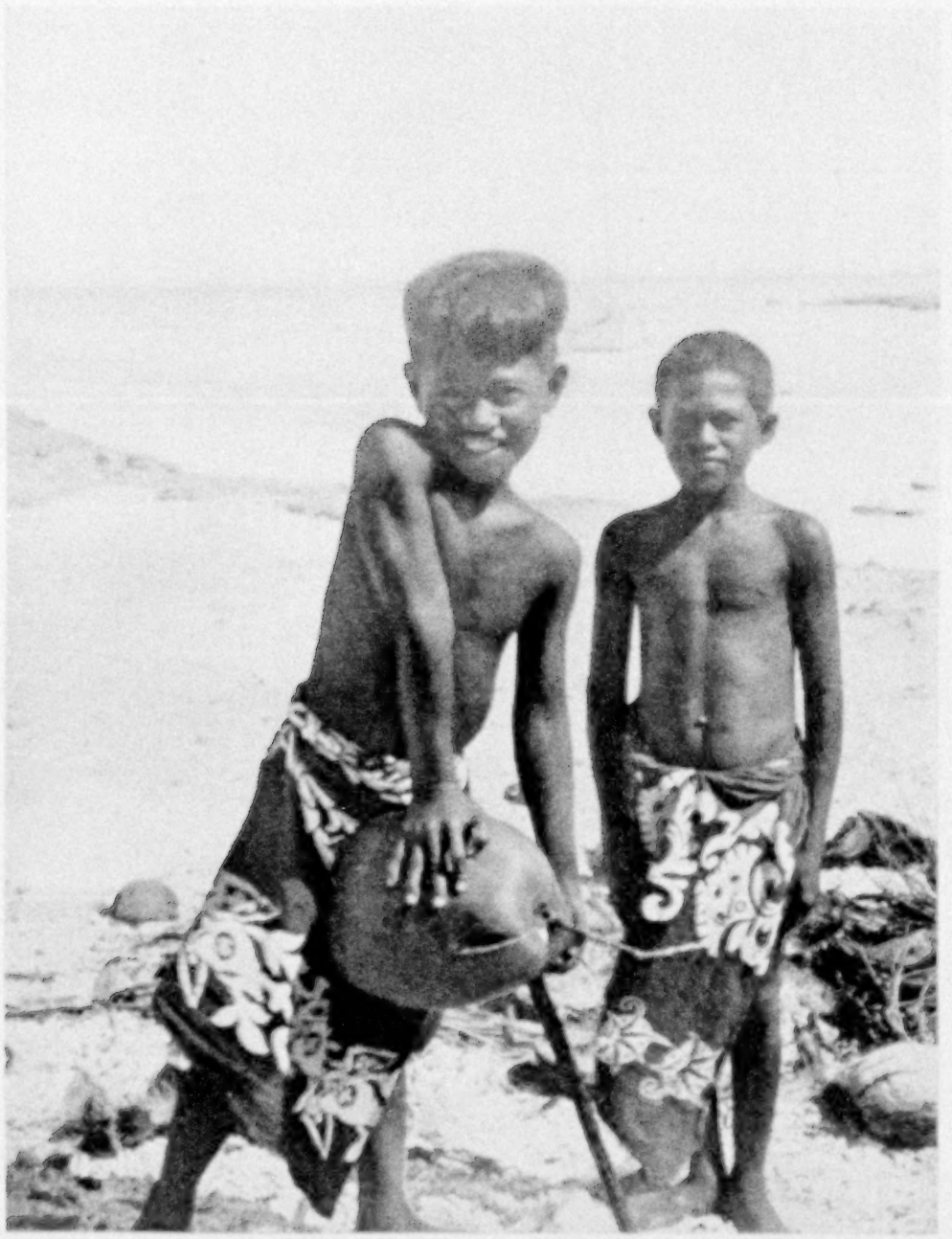
A WORKER IN THE TARO FIELDS OF RAPA

The taro has thick, tuberous roots and large heart-shaped leaves. The leaves are eaten as a sort of spinach, while the roots are used either like potatoes or in the form of *poipoi*, which is made by boiling them, then grinding, and allowing the substance to ferment for a day or two. The result is a paste much esteemed by the natives.

"Typee" made Melville a literary lion the world over, and, although the book lacks the imaginative power of his whaling romance, "Moby Dick," it is, nevertheless, a tale which one can scarce lay aside unfinished. Moreover, the modern ethnologist does not hesitate to record the observations of its author with the same assurance that he would feel in quoting from a work of scientific scholarship.

Melville followed "Typee" with a sequel entitled "Omoo," dealing with the Society Group, and his success evidently spurred a host of lesser travelers, whalemen, and romancers to burst into print.

A considerable proportion of the books of the era were by British "globe-trotters," and, although these are of very irregular merit, they contain scattered kernels of priceless information.



YOUTHFUL COPRA WORKERS OF APATAKI ISLAND

A native boy shows how simply a coconut can be husked on a stake.

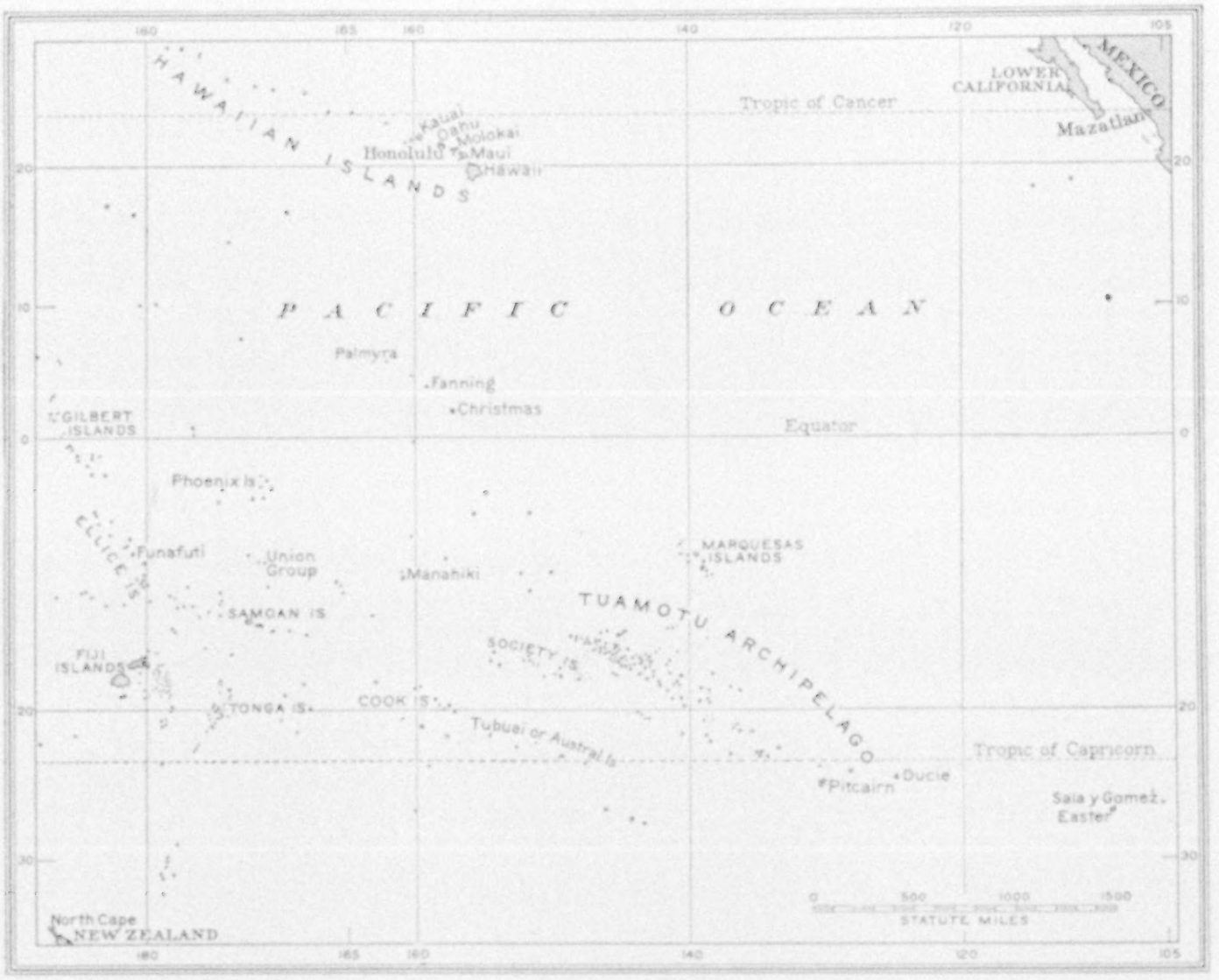
The South Sea cult, if it may be so called, found its way even into literature for children. One famous, though long forgotten, example should be cited—Ballantyne's "Coral Island," published in 1858.

This is a book of the "Swiss Family Robinson" order, only much more so! It is excruciatingly melodramatic, with a pious moral on every page, and quaintly absurd in its geography, natural history, and ethnology. It reflects the influence of Ellis and Melville; but the penguins (which inhabit coral atolls!) the coconuts (which grow without husks!) and many other surprising flights of fancy must be credited entirely to Ballantyne's creative imagination.

Pens continued busily throughout what might be termed the Melville epoch, but it remained for Robert Louis Stevenson to place once more the stamp of genius upon Pacific literature.

"In the South Seas" and other essays are, of course, beguiling and informing. Stevenson is at his best, however, when recording his pure impressions of the islands and their inhabitants; when he turns to moralizing or quasi-scientific speculation, he is usually wrong.

In the more recent exploitation and advertisement of Polynesia, literary men have had to share the honors with painters. The artistry of John La Farge and Paul Gauguin, for example, has had its part in the popular flare, no less than that



Drawn by James M. Darley

A SKETCH MAP OF THE ARCHIPELAGOES OF POLYNESIA

Polynesia ("Many Isles") comprises land areas of the Central Pacific Ocean lying within a rectangle bounded by the longitudes of 105° and 165° east, and latitudes 10° north and 30° south. (See, also, detail map of the Tuamotu, Marquesas, and Austral Islands, page 366.)

of Stevenson and Pierre Loti. Finally, the group of contemporary writers have found among the islands subjects which are always alluring and, to the bulk of readers, always new.

So much for a brief sketch of the popular history of the South Pacific, the object of which is to show that at more or less regular intervals someone has had the talent to "rediscover" Polynesia, and to put the region into the minds of multitudes.

THE GREAT TALES OF COOK AND OTHER VOYAGERS

It must be emphasized that most of the great tales have not been written within our own lifetime. The modern reader cannot afford, indeed, to neglect the wealth of information and the thrill of glorious adventure suggested by the names of Quiros, Roggewein, Forster, Sir Joseph Banks, Bligh, Vancouver, Wallis, Krusenstern, Marchand, Carteret, G. A. Byron (grandfather of the poet), James Wilson, F. D. Bennett, Kotzebue, Wilkes, La Pérouse, Porter, Langsdorff, Darwin, Fitzroy, du Petit-Thouars, Garcia, Dumont d'Urville, Beechey, and Stewart.

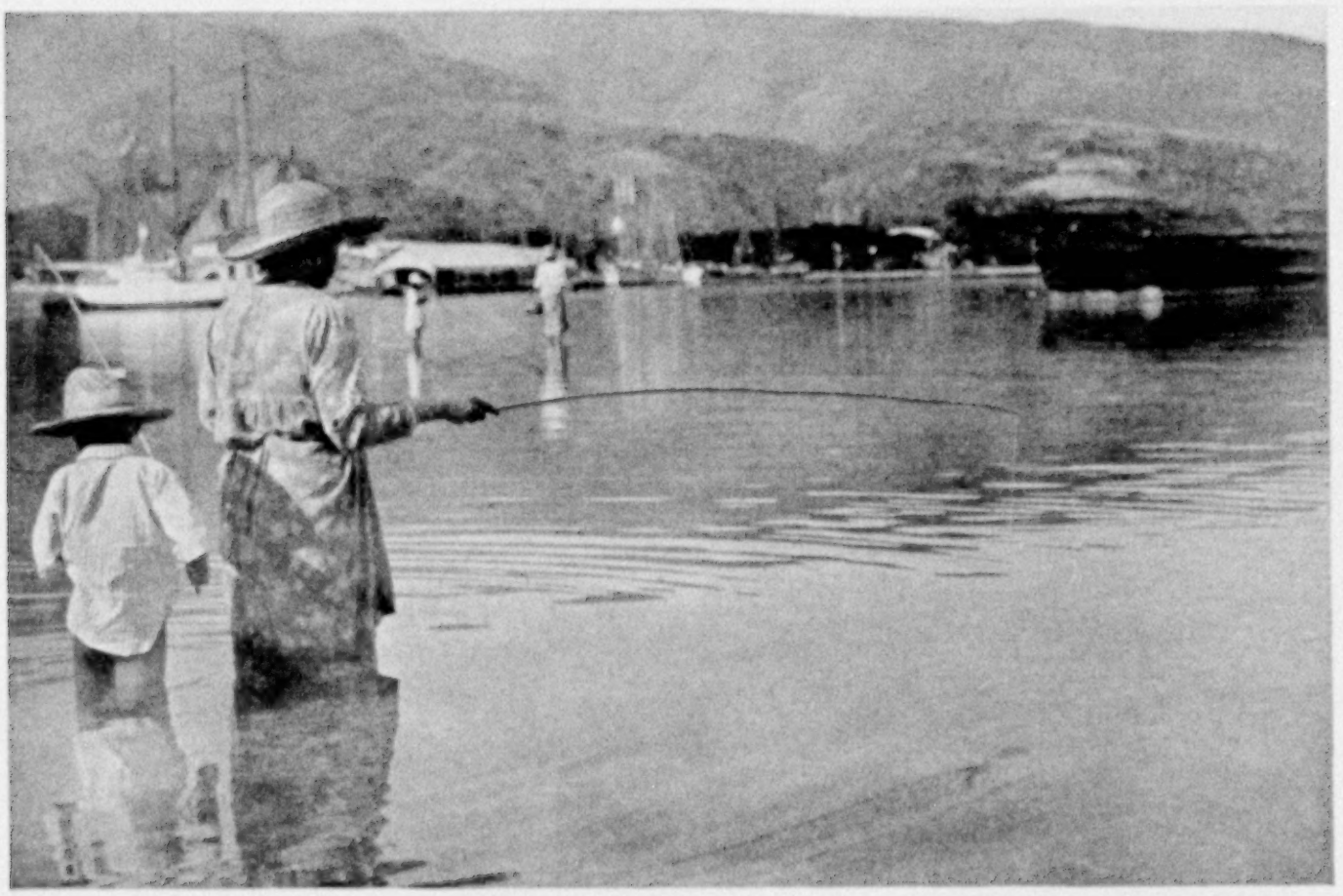
If one would know the South Pacific in its day of barbaric splendor he must go back to the yellowed pages of Cook's "Voyages," to read Homeric descriptions of Tongan feasts, of pagan sacrifices, or of the maneuvers of the Tahitian canoe fleet, with its 7,760 fighting spearsmen, for the war against Moorea.

To turn from the present-day writers to James Cook is to feel

"like some watcher of the skies
When a new planet swims into his ken."

SEARCHING FOR THE MOUNTAIN BREEDING GROUNDS OF THE TAHITIAN PETREL

Beyond the crest looms the Diadem, the loftiest of whose jutting spurs towers 4,000 feet above the sea.



MODERN POLYNESIANS

Fishing parties on the fringing reef of Tahiti, in the harbor of the port and capital, Papeete.

INSPECTING THE NEST OF A MINA BIRD IN TAHITI

The white man brought the mina to the South Seas. He also introduced the weavers, hawks, rock pigeons, and Indian bulbuls.

The genius of the great voyager, the strength of his character, and his gift for critical observation stand out everywhere in his record. After a reader has followed him and lived with him through crowded years of his travels, the futile tragedy at Hawaii which ended his noble career comes as a dramatic, fateful blow, such as is rarely equaled in either history or fiction.

GEOGRAPHY OF POLYNESIA

In our consideration of the Polynesian archipelagoes, New Zealand may be disregarded because of its geographic affinity with the Australasian land masses. Hawaii, likewise, will be omitted, partly because of its remote location, north of the Equator and outside the field of the American Museum's contemporary investigations, and, more especially, because President Grosvenor, of the National Geographic Society, has recently published an admirable account of his Hawaiian studies and personal field work, which filled an entire number of the NATIONAL GEOGRAPHIC MAGAZINE.*

The typically "South Sea" islands, some of which stand alone while a larger number enter into clusters of considerable magnitude, include such important groups as the Society, Tuamotu, Marquesas, Austral, Samoa, Ellice, Phœnix, Union, Manihiki, and Tonga Islands. In general, they lie within a rectangle bounded by the longitudes of 105° and 165° east, and latitudes of 10° north and 30° south (see map, page 358).

The total number of islands is impracticable to estimate, for an atoll of a single name may in reality be composed of scores of separate islets. Brigham's "Index to the Islands of the Pacific" lists about 2,650 main bodies of land, after the elimination of synonyms applied by successive European discoverers.

The terrestrial area is in the neighborhood of 3,500 square miles, exclusive of Hawaii and New Zealand. The Societies, one of the larger groups, comprise about

* See "The Hawaiian Islands: America's Strongest Outpost of Defense—the Volcanic Floral Wonderland of the World," by Gilbert Grosvenor, LL. D., in the NATIONAL GEOGRAPHIC MAGAZINE for February, 1924.

A WORLD WAR MONUMENT AT PAPEETE, TAHITI

"Les Etablissements Français de l'Oceanie a leurs Enfants Morts pour la France 1914-1918" is the inscription on this marble memorial.

637 square miles; the Marquesas, 490; and the Tuamotus, for all their "Cloud of Islands," which is the meaning of the original native name—80 islands and numberless fragments—sum up to but 364 square miles.

Politically, the Society, Marquesas, Tuamotu, and Austral islands have been French since the middle and latter parts of the last century. Many of the others are British colonial possessions, or are now under New Zealand mandate.

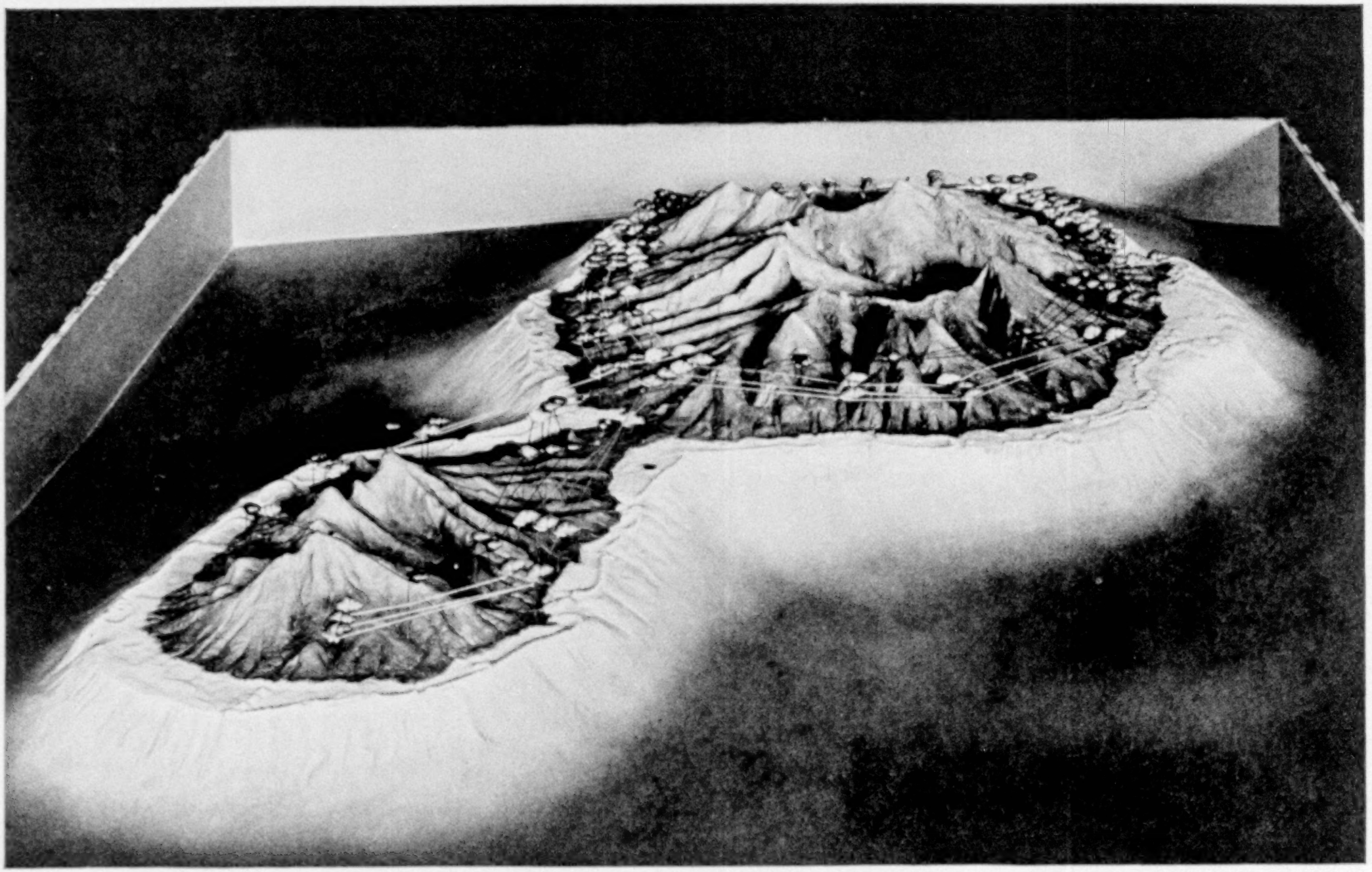
The United States has undisputed control over part of Samoa and less definite claims upon certain other islets. Easter Island and Sala-y-Gomez, the eastern outposts of the region, are Chilean.

For a clear record of the rather complicated status of post-war sovereignty, the reader is referred to the authoritative map of the Pacific, which was issued as a supplement to the NATIONAL GEOGRAPHIC MAGAZINE for December, 1921.

REEF-FORMING CORAL RESPONSIBLE FOR MANY ISLANDS

In the western South Pacific, as at Hawaii, volcanic phenomena are still in active progress, but, throughout the area with which we are here concerned, the earth-building fires have long been extinguished.

Disintegrating rock and erecting coral, separately or in combination, make up the



A PROFILE MAP OF TAHITI SHOWING THE ERODED VOLCANIC CORE, THE LAGOON, FRINGING REEF, AND BARRIER REEF

The main body of Tahiti consists of two high land masses connected by a low isthmus. The core of richly carpeted volcanic hills is surrounded by a coastal plain, which reaches a width of as much as a mile only at the mouths of the river valleys. Around the strand-belt are the fringing reefs, which extend, just awash or slightly submerged, into the lagoon moat (see text, page 363). Principles of geographical distribution are illustrated by land snails of the genus Partula.

structure of the innumerable dots in the wide sea, although more fundamental movements in the floor of the ocean basin itself have often compensated for the wasting tendency of the one or vitiated the constructive power of the other.

At certain islands the bottoms of the very bays in which the old-time explorers anchored have sunk or risen with the subsequent action of forces beneath the ocean.

The limits of the range of reef-forming corals in the central Pacific are roughly indicated by the parallels of 28° north and 30° south. But steep shores, and consequent absence of shallow coastal shelves, prevent the growth of reef-corals even within the favored area. The beetling Marquesas, with all but strandless shorelines, are, for example, without a girdle of reefs.

TAHITI IS EXAMPLE OF COMPOSITE VOLCANIC AND CORAL ISLAND

At Tahiti, as a type of the composite islands which attain the peak of Polynesian diversity and beauty, the core of worn and richly carpeted volcanic hills is surrounded by a coastal plain which reaches a width as great as a mile only in the mouths of the river valleys (see relief map on preceding page).

This encircling strand is a strip of great fertility, and is the only zone of such cultural plants as the coconut, sugar cane, banana, coffee, and vanilla. It was also the sole belt of permanent human habitation, even when the classic isle supported 150,000 aboriginal people, the estimate of Sir Joseph Banks in the late 18th century.

The strand overlies an ancient lava bench and portions of a buried fringing reef, although the surface soil, a product of crumbling uplands, has now in many places a thickness of nearly 20 feet.

Around the strand-belt, which here and there narrows until it disappears altogether, are the fringing reefs. These extend, just awash or slightly submerged, into the lagoon-moat. The latter is of varying breadth, and of a maximum depth of about 18 fathoms. It is in turn protected from the battering rollers of the open Pacific by the barrier reef, which is broken by numerous passes, especially opposite the outlets of streams where the flow of fresh water tends to inhibit the growth of coral.

At most points the moat is broad and navigable, but at intervals it narrows to such an extent that the fringing and barrier reefs practically coalesce.

The main body of Tahiti comprises two high land masses connected by a low isthmus. The larger mass culminates in several sharp peaks, of which Orohena is credited with an altitude of 7,321 feet.

Both Tahiti proper and its smaller peninsula have been dissected through tremendous erosion, which has produced many valleys with almost vertical walls and knifelike dividing ridges.

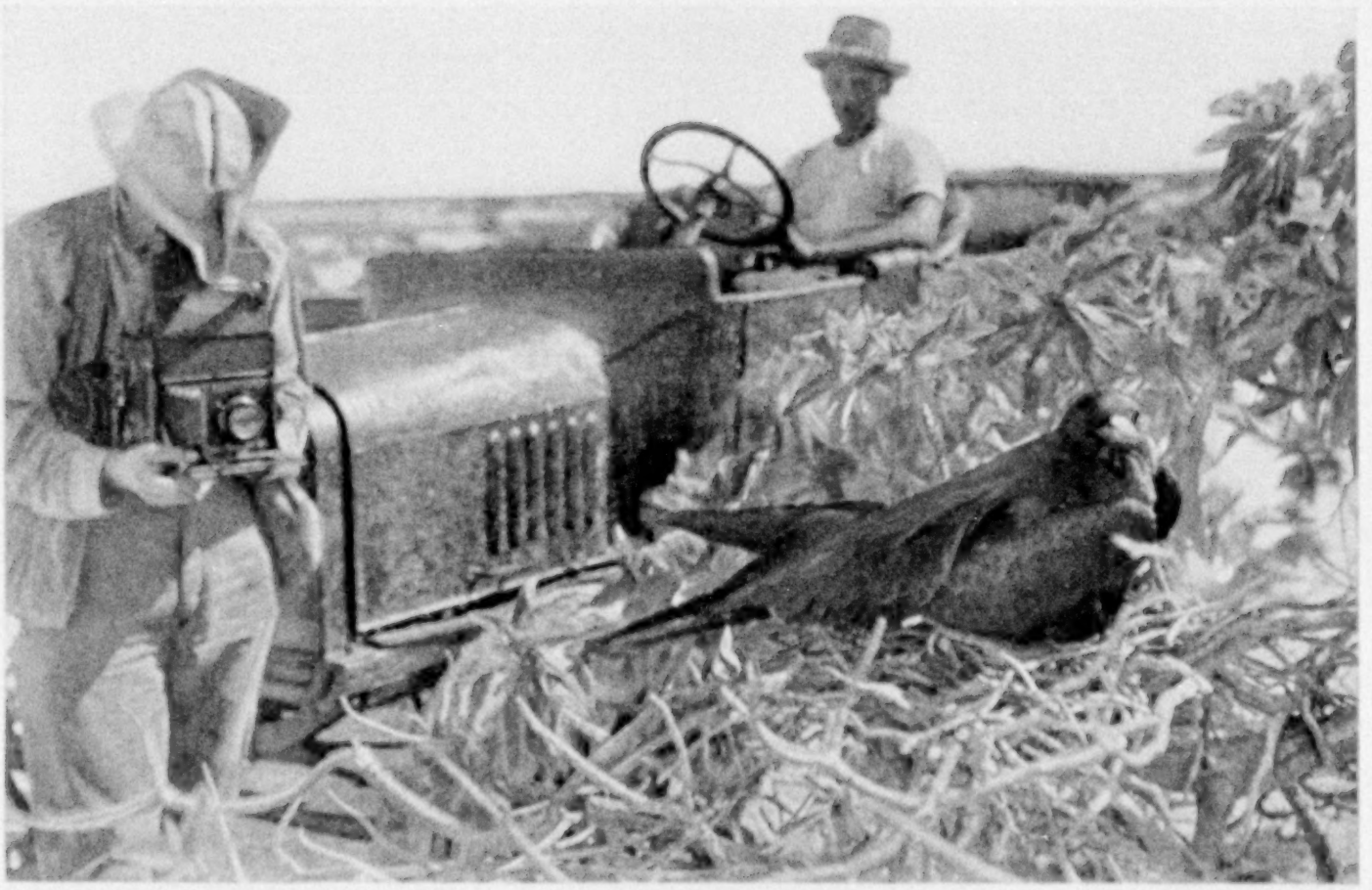
These gorges are, in fact, so sharply marked off one from another by factors of altitude and plant zones that the respective populations of such creatures as sedentary insects and land snails are as completely isolated from each other as if they were on opposite sides of the world. Professor Henry E. Crampton has taken advantage of the circumstances which have converted the various valleys into natural laboratories of evolution, and has published a brilliant series of studies upon the astonishing geographic variation in one genus of land mollusks inhabiting this single island.

Turning to the atolls, or coral rings without a central pile of hills, we find that several large Pacific groups include islands of no other type. Atolls, however, are rarely in the form of the perfectly symmetrical, palm-lined "doughnuts" so quaintly portrayed in the woodcuts of old geographies. Most of them are highly irregular in outline and, moreover, the land which actually projects above the surface of the ocean is more often a chain of disconnected islets or *motus* than a ribbon of continuous beach.

The principal entrance to the lagoon is usually at the northwesterly or leeward end, for corals thrive best and build the strongest bulwarks on windward shores, or where the southeast trade wind heaps up the waters which bear their sustenance.

Hau Island, of the vast Tuamotu archipelago, may serve as a characteristic example of the low islands. It is thirty miles in length, seven in breadth across the widest part of the lagoon, with the longer axis parallel with the course of the

A TROPHY OF THE TROLLED LINE: A TUNNY CAUGHT NEAR CHRISTMAS ISLAND



BIRD STUDY DE LUXE

The naturalists of the Whitney Expedition enjoyed the use of Pére Rougier's American motor cars at Christmas Island (see text, page 402). The subject being photographed is a man-of-war bird. At the nesting time these birds are seemingly without fear.

THE SHARK HAS STRUCK

A familiar scene to one who has traversed the tropical ocean in a windjammer.

trades. The only entrance is at the leeward end (see page 369).

The long thread of the reef is elsewhere unbroken by navigable channels, but the "dry land" is made up of more than 100 distinct units, of which the longest has an extent of perhaps eight miles.

Since the greatest width of the islets nowhere equals a mile, it is clear that the coral-studded lagoon makes up 99 per cent or more of the entire area of the atoll. This explains why it is possible for vessels to sail into the lagoons of certain Pacific coral-rings and to anchor *out of sight of land* in the heart of glassy and sheltered waters.

In such friendly lagoons the primitive atoll-dweller plied his paddle, and on the quiet inner beach he built his villages.

The jagged spit behind his home was often a desolate and uninhabited waste, while the outer stretches, toward the booming sea, were, as Stevenson tells us, the abode of horrible specters among which the superstitious islander would hardly venture alone.

Here the rollers crashed as if they envied the peace within, and sought to destroy it; but the greater their volume and power, the more luxuriant became the soft, living coating of the limy breastworks.

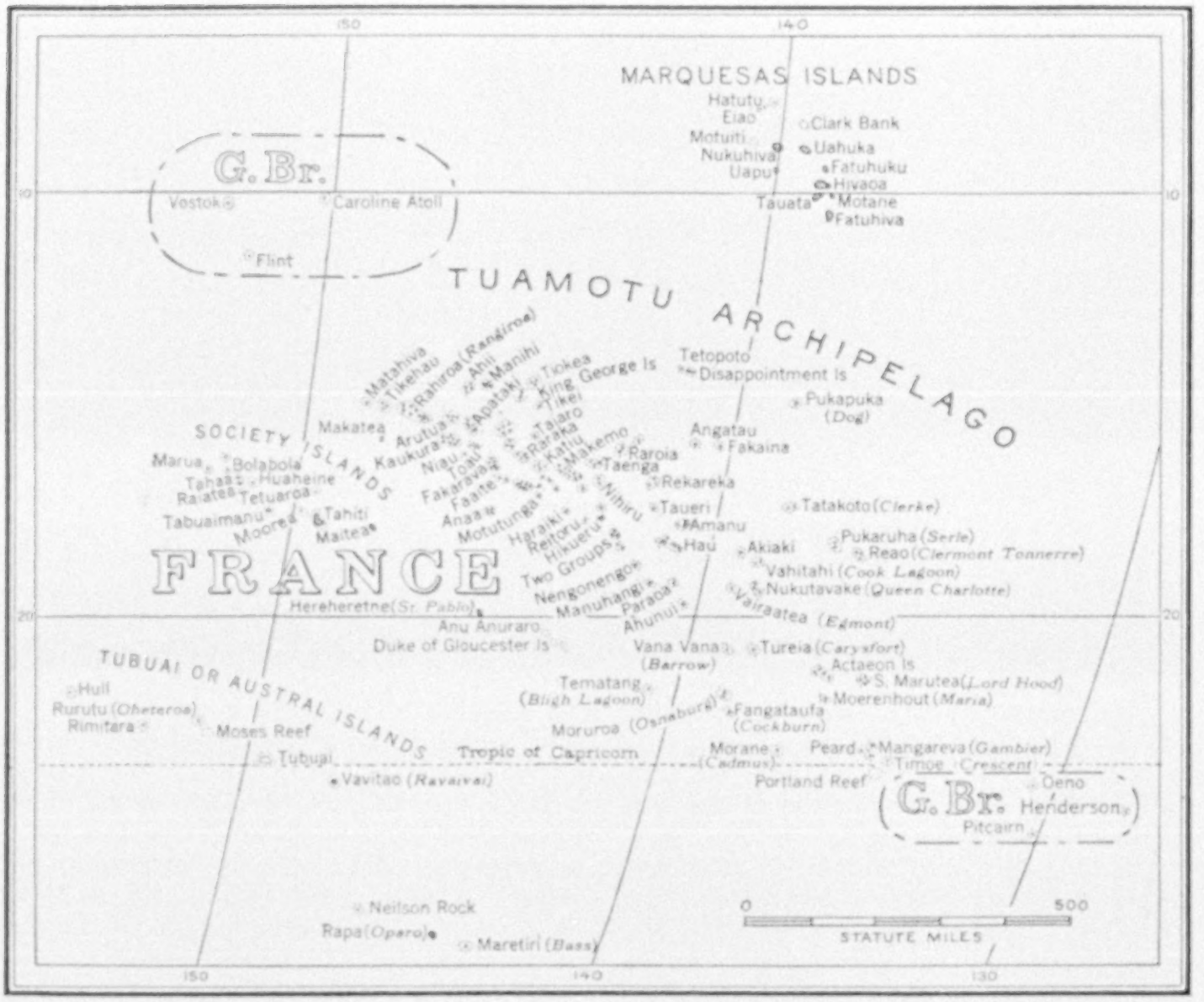
It is not difficult to comprehend that the seaward rim of an atoll, across which a hurricane might send an avalanche of water, should seem depressing to the Tuamotuan, whereas the native of such a lofty island as Nukuhiva could plunge joyfully into breakers which pounded his citadel in vain.

ORIGIN OF ATOLLS A SUBJECT OF FAMOUS CONTROVERSY

The scientific controversy regarding the origin of atolls is an old and famous one, and is not yet fully settled. Darwin held that the rings of coral, which sometimes rise from depths far below the limit at which reef-building polyps can live, are the result of the gradual wearing away or subsidence of a central land mass, accompanied by the equally slow upgrowth of the girdling reef.

According to this view, each atoll is in effect the barrier reef of an island which has vanished, or of a submarine mound which approaches the surface of the sea. More crudely stated, the atoll is the crown of a sinking volcano.

Sir John Murray, the botanist Guppy, and Professor Alexander Agassiz combatted this theory, and showed that reefs exist in parts of the Pacific where there



Drawn by A. H. Bumstead and James M. Darley

THE MARQUESAS, TUAMOTU, AND AUSTRAL ISLANDS (SEE, ALSO, MAP, PAGE 358)

The three main archipelagoes belong to France, while the small groups to the northwest and the southeast are British possessions. The aggregate land area of the Marquesas group is less than 500 square miles; of the Tuamotu ("Cloud of Islands"), 364 square miles. This map is a detail from the National Geographic Society's "Map of the Islands of the Pacific," in colors, size 24 x 18 inches.

is no evidence of subsidence, but where, on the contrary, there has been uplift.

Borings made at the atoll of Funafuti, however, both through the ring itself and through the bottom of the enclosed lagoon, revealed the presence of coral rock to a depth of 1,114 feet.

Since reef corals cannot grow below 20 fathoms, the Funafuti experiment points to a progressive sinking of the ocean floor in this region, and confirms the older explanation. Many facts of zoological distribution in the Pacific make it difficult to avoid the same conclusion.

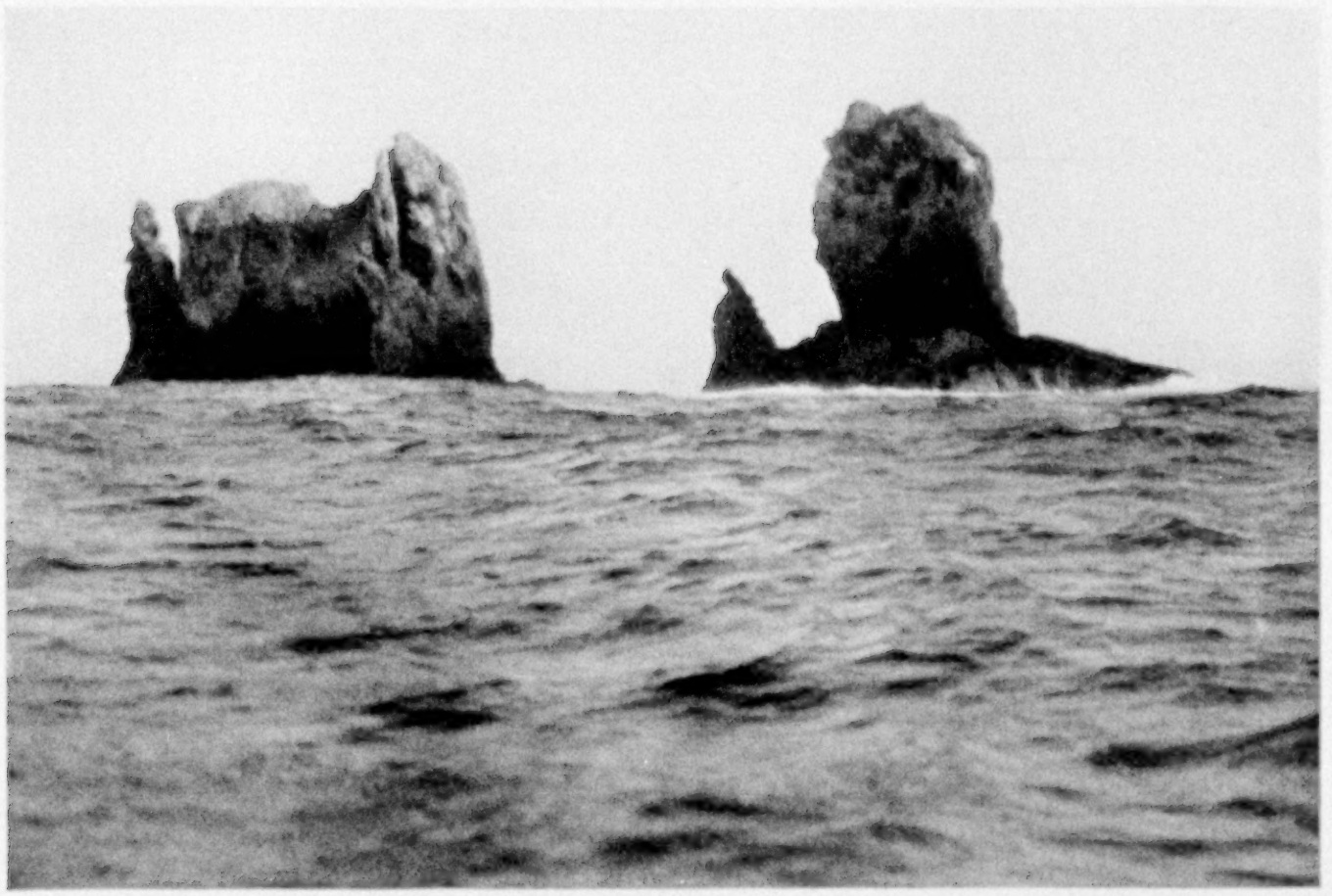
CLIMATE AND VEGETATION OF POLYNESIA

The final type of island to be mentioned is the secondarily upraised or tilted atoll, which may present cliffs and hills of considerable altitude and of misleading superficial appearance.

The greater number of the Polynesian islands lie within the zone of the southeast trade wind, and enjoy a mild and equable climate, although many of the groups near the Equator are subject to hurricanes.

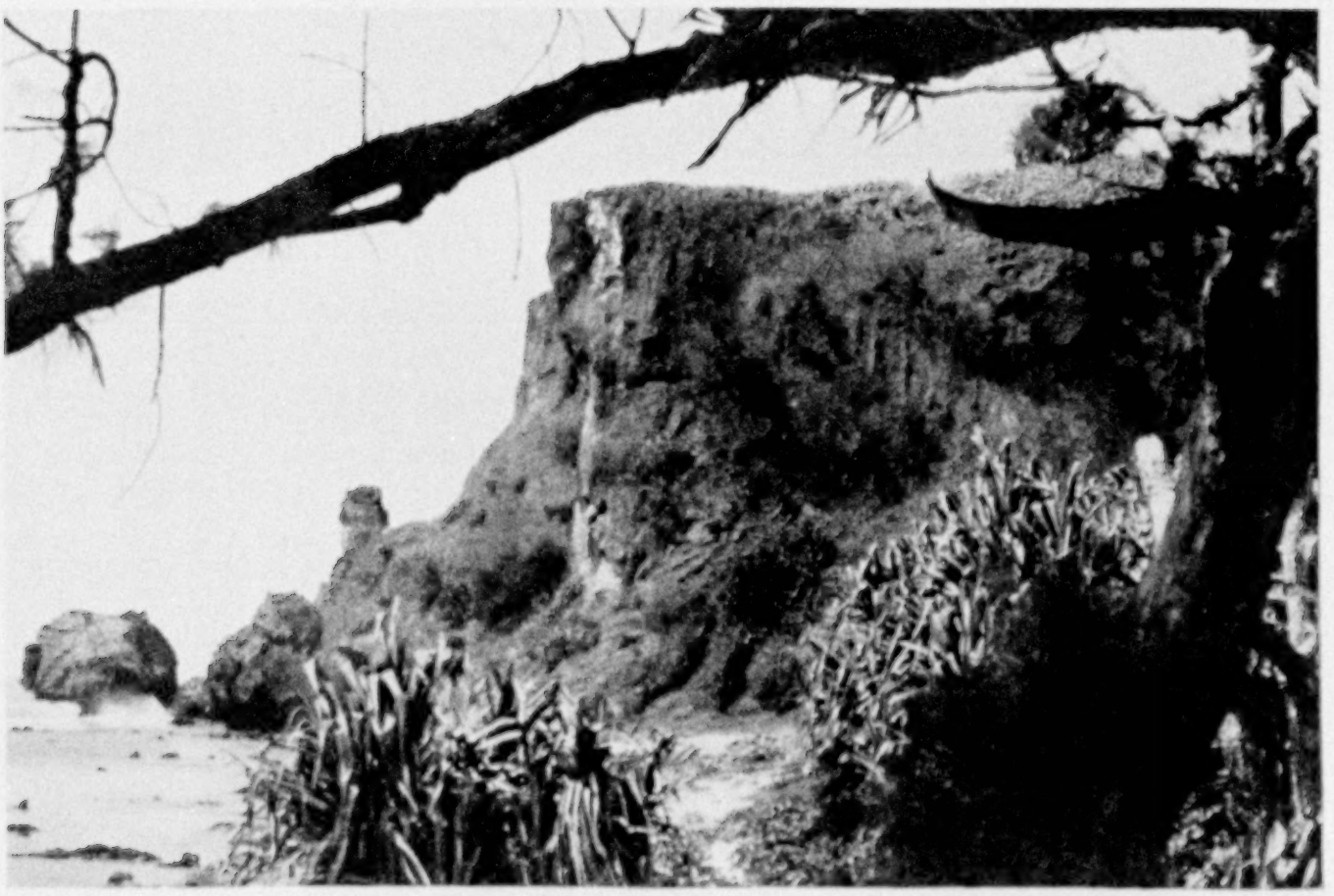
Rainfall is naturally most copious on the windward, or southeasterly, slopes of the high islands. In the Marquesas the difference is so pronounced that the principal islands have a heavily forested windward face, and a leeward, semi-desert side, where the vegetation and the fauna may be quite distinct.

In the same way, a high island often produces a "rain shadow" which more or



BASS ROCKS, SOUTHWARD FROM RAPA, THE LAST OUTPOSTS BETWEEN POLYNESIA AND THE ANTARCTIC

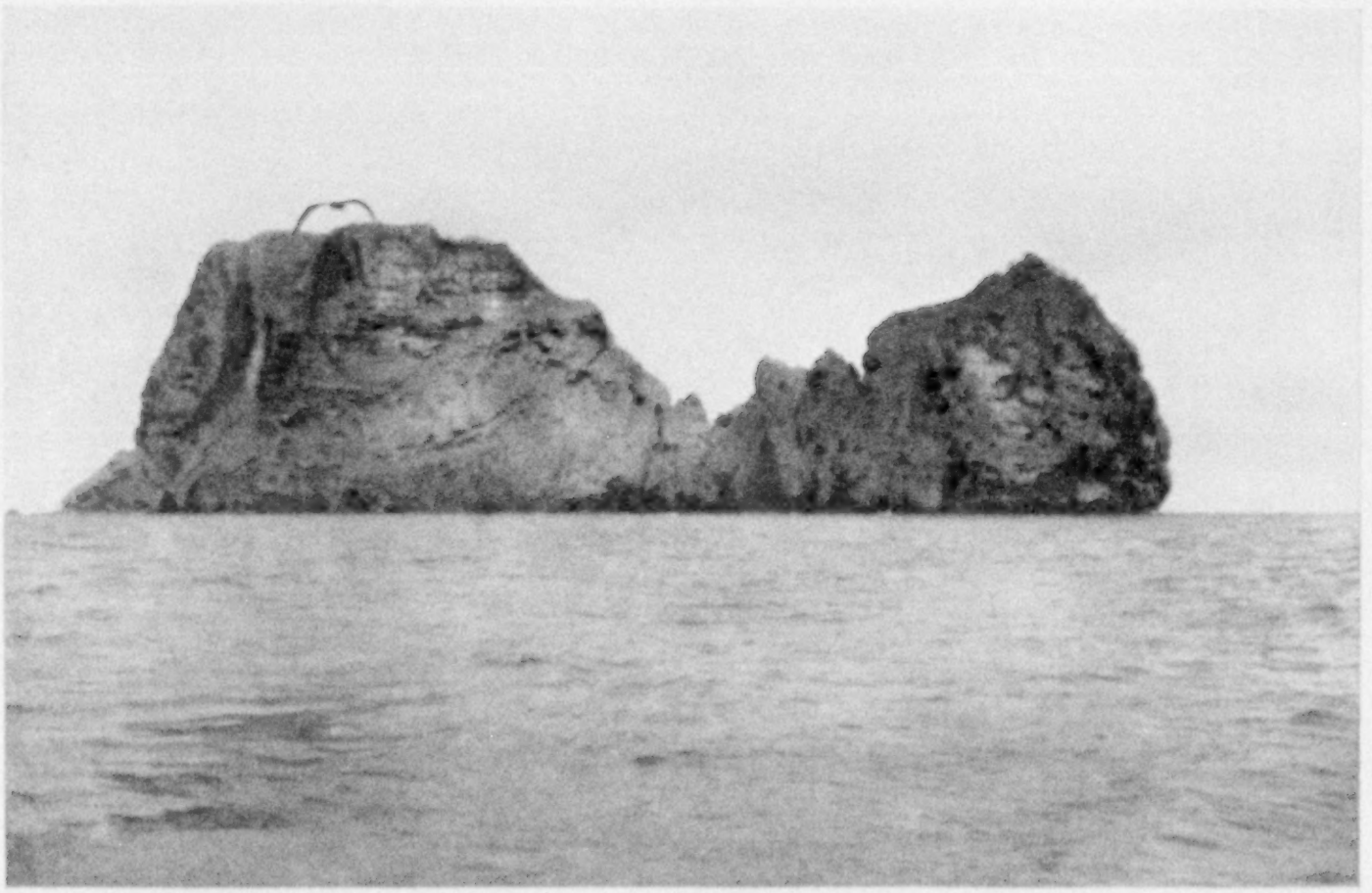
"Here there is no place to land on from out of the gray water. For without are sharp crags, and round them the wave roars surging, and sheer the smooth rock rises" (Homer).



AN UPLIFTED CORAL CLIFF OF RURUTU: AUSTRAL GROUP

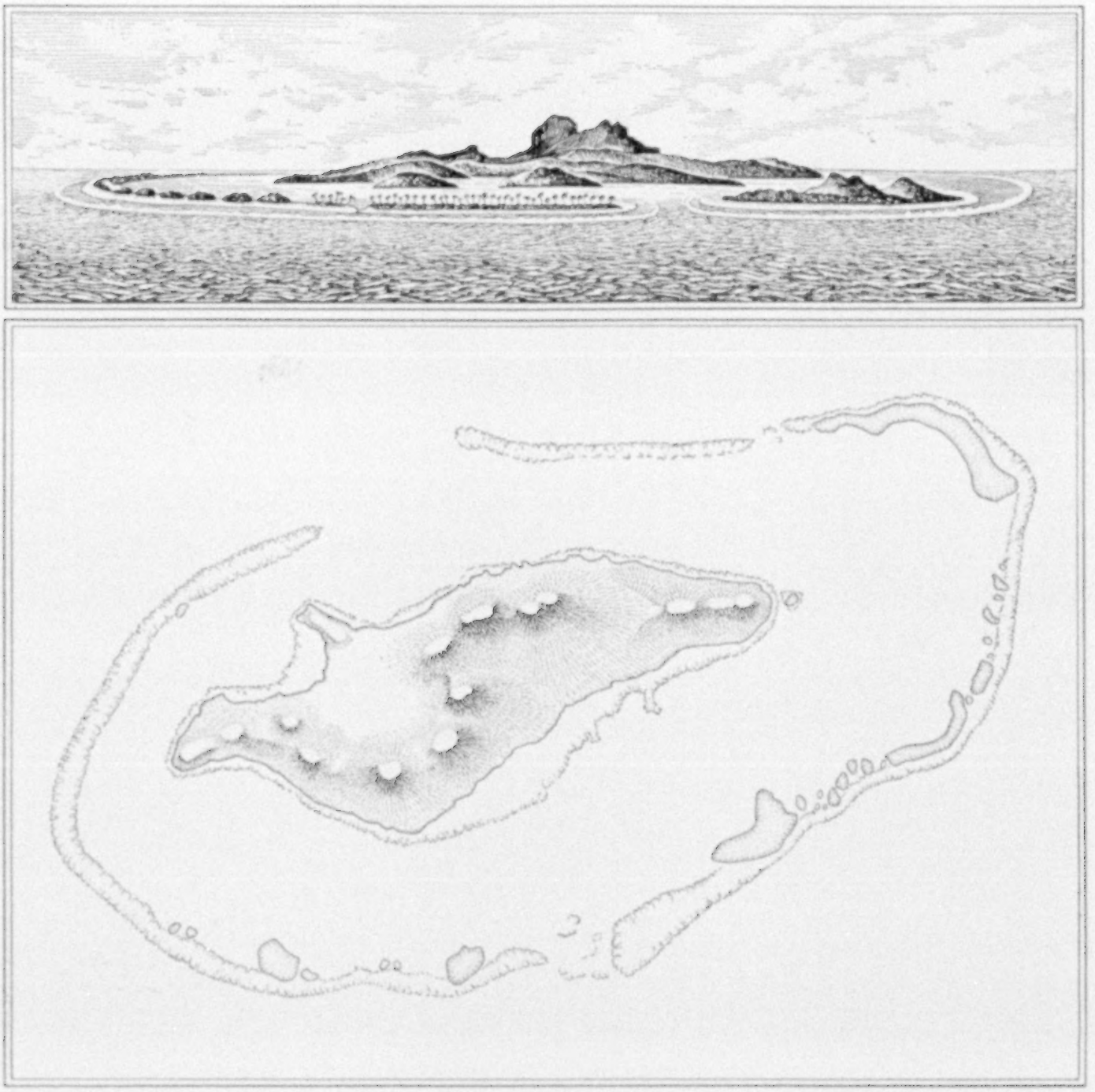
In places this structure of submarine origin now rears 300 feet above the sea (see text, page 366).

THE "FRANCE" BETWEEN BEETLING CLIFFS OF TAUATA ISLAND, MARQUESAS



THE ISLE OF FATUHIVA, MARQUESAS

In viewing this incredible little island from the sea, who would suspect that for ages its valleys harbored tribes that were sworn and bloodthirsty enemies? One shore was totally tabu, for example, to the hostile inhabitants of the other, beyond the mountains.



Drawn by William E. Belanske

THE TOPOGRAPHY OF A CORAL-RINGED VOLCANIC ISLE: PROFILE OF BOLABOLA, OF THE SOCIETY GROUP, AFTER ALEXANDER AGASSIZ

Below is Vavitao, of the Austral group, from a Hydrographic Office chart. These represent the type of Polynesian islands which attain the height of beauty and diversity. The drawings show the volcanic central mass, with weathered peaks, the thickly forested and more maturely weathered surrounding hills, the fringing reefs of the main body of land, the lagoon moat, and the inclosing barrier reef. The latter is partly awash, but is studded with higher islets, or *motus*, some of which support a rich growth of coconut palms and strand vegetation (see, also, relief map of Tahiti, page 362).

less thoroughly deprives its leeward neighbor of moisture, leading to considerable geographic diversity within small groups.

The Polynesian flora is pronouncedly Asiatic. The vegetation of the fertile volcanic islands is relatively rich; that of the coral islands scanty. Among the latter the coconut, pandanus, and mangrove are almost the only conspicuous native trees.

In the high islands the more interesting forms of plant life, including all the species peculiar to the region, begin at an altitude of 1,000 feet or more above the sea. Orchids and ferns are abundant, the latter constituting fully 15 per cent of the total flora.

COFFEE PICKERS OF RAPA

These young women are not "posing," but were photographed unawares at their task.

At the Society Islands and elsewhere the indigenous valley forest is largely made up of tree ferns which descend well toward sea level in moist valleys, but not much below 1,500 feet on the drier coasts.

FEI, TARO, AND BREADFRUIT ARE IMPORTANT FOOD STAPLES

Features of the hillsides between 3,000 and 5,000 feet are the thickets of the fei, or Polynesian wild banana, an important source of food to-day as in prehistoric times (see page 385).

Another widely distributed staple, which, however, grows in the lowlands and is intensively cultivated, is the taro (see Color Plate IV), distantly related to our jack-in-the-pulpit. Both root and leaves of this plant are edible after cooking has destroyed its acrid taste.

Still another important starchy food is supplied by the famous breadfruit, of which a score of varieties flourish among the Pacific islands.

The Marquesans of old practiced the laudable custom of planting breadfruit trees upon the birth of children, to insure the subsistence of their descendants. Owing to the dying out of the people and the lack of recent cultivation, the breadfruit is gradually disappearing over wide areas, for the seedless tree cannot compete unassisted with the more vigorous forest flora.

At such a long-settled island as Tahiti, a discerning visitor notes at once that

STRIPLINGS OF RIMITARA ISLAND, AUSTRAL GROUP, BOUND FOR SEA

enormous changes in the vegetation have occurred since the discovery. The transformation is most evident in the coastal plain, but even on the higher slopes many of the native plants have been driven out or upward by such interlopers as the guava and the tropical American lantana.

INTRODUCED PLANT PESTS RESPONSIBLE FOR SOUTH SEA "JUNGLES"

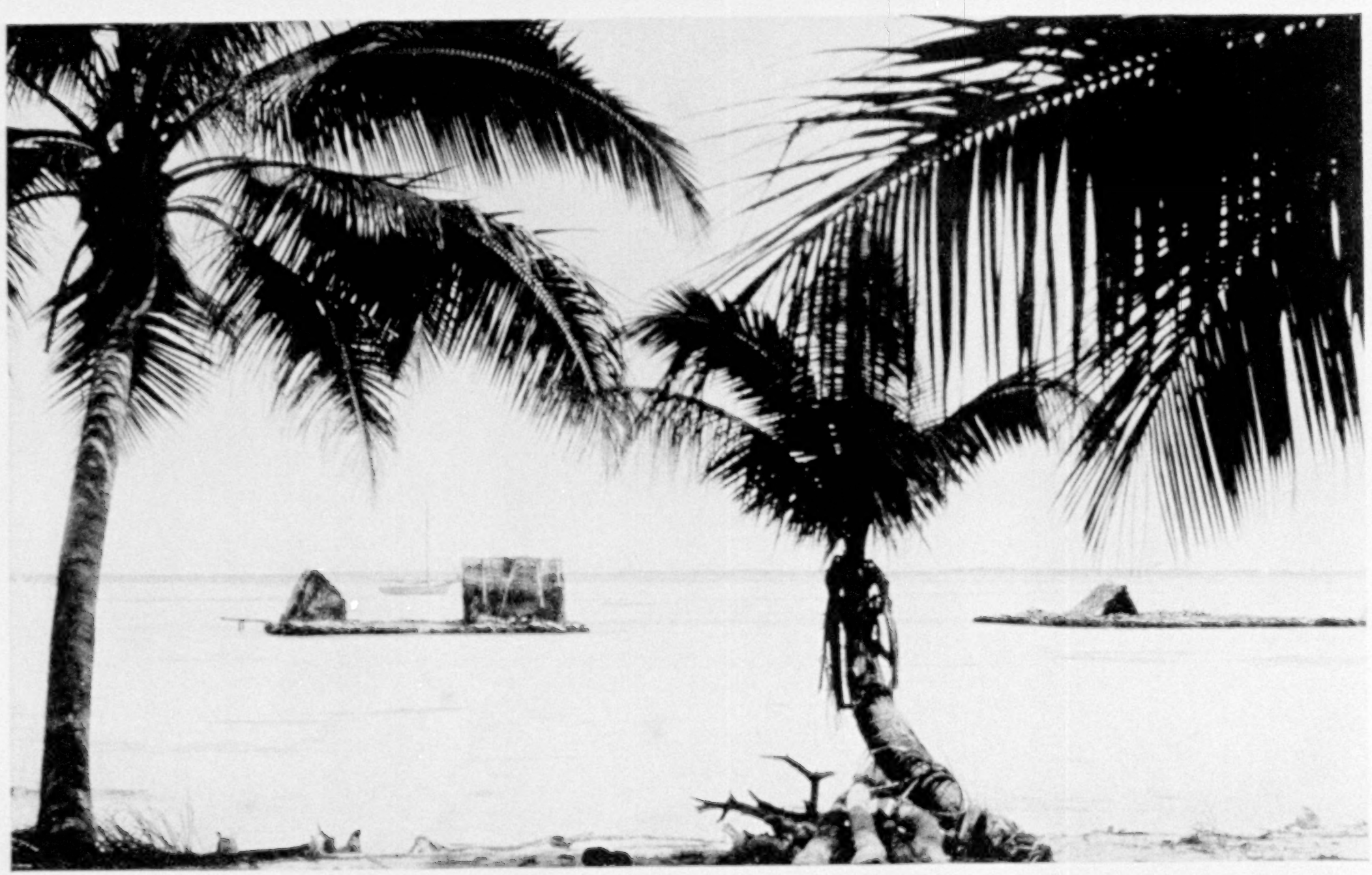
The rapid dissemination of the thorny lantana is due to the agency of another introduced form of life—the Indian starling, or "mina."

Writing of similar conditions in Hawaii, Brigham says: "The lantana (*L. camara*) was cultivated for years in gardens in the Hawaiian Islands, but it showed no tendency to spread until the so-called mina (*Acridotheres tristis*) was introduced, when the berry became its favorite food and the indigestible seed was scattered everywhere."

Although the Polynesian islands were never lacking in areas of dense and tangled vegetation, it is the introduced plant-pests, rather than native flora, which are responsible for much of the impenetrable "jungle" found to-day.

In the higher, less affected places the steepness of the slope and the crumbling nature of the soil and rock contribute more toward the "inexplorable" conditions than the thickness of the vegetation.

The absence of poisonous plants on most of the islands and the paucity of native edible fruits are further characteristics of the Polynesian flora.



RAT-PROOF STOREHOUSES FOR COPRA IN THE LAGOON OF KAUEHI

On some of the islets of the South Pacific, as at Tahiti, rats and mice were the only indigenous mammals found by white men. They have become a real pest, and the natives have devised water-bound storehouses for their harvested crops.

All the fruits which now abound in the gardens and orchards have been introduced since the time of the early discoverers.

RATS AND MICE WERE FORMERLY ONLY LAND MAMMALS OF POLYNESIA

Throughout the easterly Polynesian groups, rats and mice were the only native land mammals, and the ancestors of some of these may have been first brought into the region by early human migrants. One must go at least as far west as Samoa before even bats become an added element in the mammalian fauna.

Reptiles have only slightly better representation. Except for sea-snakes, there is none of the serpent kind in the long expanse between Samoa and the Galápagos Islands.

The clinging-footed geckos are the commonest of Polynesian reptiles, no less than eight genera occurring, together with half that many genera of the small lizards known as skinks.

Amphibians are practically wanting, for although a single species of toad inhabits Hawaii, we must make a long jump beyond the western limits of the region—to the Fiji and Solomon Islands—before we encounter frogs, salamanders, or another toad.

The birds of the South Sea Islands, both indigenous species and migrants, naturally exemplify a wide variety of marine and terrestrial forms and warrant special consideration in some future number of this magazine.*

MELVILLE ACCUSES REVENGEFUL WHALER OF INTRODUCING MOSQUITOES

The writer knows little about the insect population, except that the number and variety decrease as one progresses in an easterly direction from islands close to Australia and Malaysia.

As would be expected, the insect fauna of the coral Tuamotus is poor indeed when contrasted with that of the luxuriant forests of Melanesian isles. Biting flies are an annoyance at certain of the Marquesas Islands and elsewhere, while mosquitoes, which doubtless include native species, are among the curses charged against the invading white man.

The tale of the alleged introduction of mosquitoes into Moorea, of the Society Islands, is related by Melville in "Omoo." It is quoted without warrant as to its accuracy:

"Some years previous a whaling captain, touching at an adjoining bay, got into difficulties with its inhabitants, and at last carried his complaint before one of the native tribunals; but receiving no satisfaction, and deeming himself aggrieved, he resolved upon taking signal revenge. One night, he towed a rotten old water-cask ashore, and left it in a neglected taro patch where the ground was warm and moist. Hence the mosquitoes."

FIRST HORSES AND GOATS ASTOUNDED NATIVES

The domestic animals which the primitive Polynesian navigators carried with them on their remarkable wanderings apparently comprised only poultry, dogs, and pigs. These have been so constantly augmented within the historic period that it is now difficult to tell what the original types were like. The modern chickens, for example, which are wild or feral on all the wooded islands, depart widely from the ancestral jungle fowl, and show the characters of many domestic strains.

Early in the last century Bennett noted that the hogs of the Marquesas "still exhibit, in great purity, the gaunt form, acute snout, arched back, high tail, pricked ears, and small deer-like feet, of the original Polynesian breed."

Razor-backed animals are still to be found, but even on small islands remote from the trade routes, one now sees many round, short-legged pigs of highly cultivated appearance.

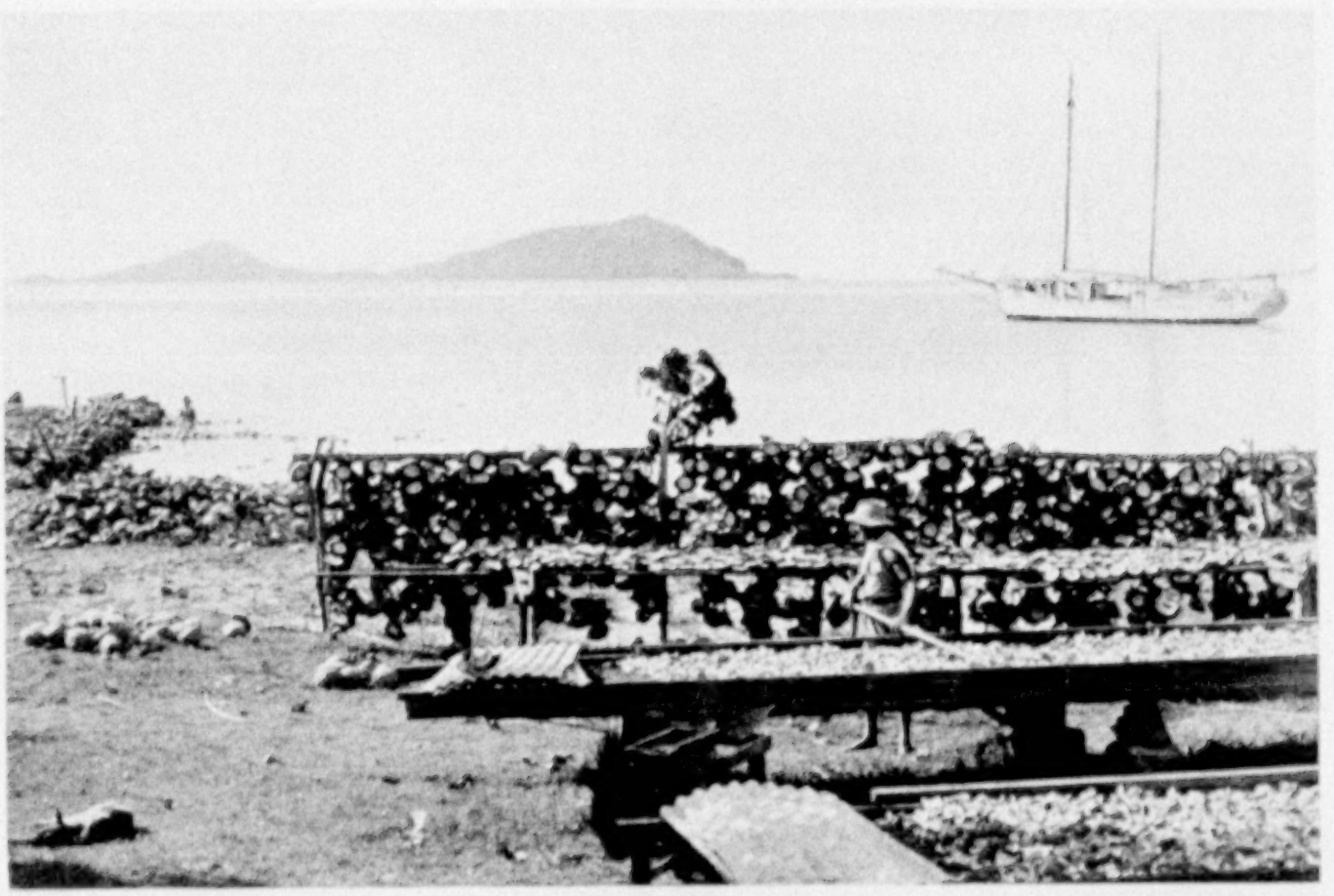
The early travelers record amusing incidents of the amazement of the islanders when they first saw such monsters as horses and goats, and of their difficulties when they set themselves the Adam's task of naming them.

"To all the exotic quadrupeds," writes Bennett, "the Tahitians apply the generic names of their indigenous kinds, giving to the larger the name of *buaa*, or pig, and to

* See, also, "Bird Life Among Lava Rock and Coral Sand" (on the Leeward Islands of the Hawaiian Group), by Dr. Alexander Wetmore, in the NATIONAL GEOGRAPHIC MAGAZINE for July, 1925.

COCONUTS READY TO BE CONVERTED INTO COPRA

The sun-dried meat of the coconut is the chief article of commerce of the South Seas. It is estimated that 1,000 full-size nuts will yield approximately 500 pounds of copra, from which 25 gallons of oil can be obtained.



DRYING COPRA AT MANGAREVA

In addition to its use in soaps and the manufacture of candles, coconut oil is now successfully utilized in the manufacture of oleomargarine.

DRYING COPRA ON TUREIA ISLAND

The coconut crop is not only profitable, but it requires no labor in cultivation and comparatively little effort in harvesting.

the smaller that of *uri*, the dog, or *iore*, the rat. The ox they name *buaa-toro*, or pig with a long neck; the horse, *buaa-horo-fenua*, or pig that runs quickly over the ground; the goat, *buaa-niho*, pig with teeth (horns) on its head. . . . The monkey, of which some examples have been taken to their shores, they call *uri-taata*, the man-dog; and the cat, *iore-pii-fare*, the rat that climbs the house."

ABORIGINAL POLYNESIANS A TALL, HANDSOME PEOPLE

Most of the islands which can strictly be called Polynesian are, or formerly were, inhabited by a rather tall and handsome aboriginal people, representing a mixed race, but very distinct from the dark-skinned and frizzly-haired Australasian natives.

In the literature of Polynesia no branch of knowledge is so obscured by uncertainty and confusion as that concerning the origin, relationships, and migrations of the people. Their entrance into the oceanic islands has been traced back indefinitely, to about the first century of the Christian era.

Dr. E. S. C. Handy has recently concluded from genealogical evidence that such a remote group of islands as the Marquesas may have been settled in the tenth century.

The racial status of the Polynesians is, if possible, even more complex a subject than that of their tenure of the numerous archipelagoes.

Earlier students not only emphasized their uniformity in culture and language, but also pointed to them as an example of striking uniformity of physical type, extending over a widely varying environment. They are described as being almost identical in appearance from Hawaii to New Zealand and from Samoa to Rapanui (Easter Island).

A great deal of sheer speculation, and no little nonsense, has been written about

A COPRA-LADEN SLOOP IN THE LAGOON CHANNEL OF MANIHI, TUAMOTU ARCHIPELAGO, WITH THE "FRANCE" IN THE BACKGROUND

BRAIDING HOUSE WALLS FROM PALM FRONDS: KAUEHI ISLAND, TUAMOTUS

In addition to the copra of commerce, the coconut palm supplies the South Sea native with one of his chief articles of food, a refreshing drink, an intoxicating beverage, timber and thatch material for his dwelling, water vessels, and fiber for ropes.

A MARQUESAN WOMAN WOOD-CARVER OF HANAVAVE VALLEY, FATUHIVA ISLAND

this subject. It is only within the last few years that the investigations of trained anthropologists have begun to solve the problems.

The late Dr. Louis R. Sullivan, Associate Curator of Anthropology in the American Museum of Natural History, says of racial types in Polynesia:

"The now rapidly accumulating data on the biology of the inhabitants of the Pacific islands are beginning to indicate clearly that the 'Polynesians' are in no sense to be considered a uniform racial type. The 'Polynesian type' is, in fact, an abstract concept, into the make-up of which have entered the characteristics of several varying physical types.

"Anthropologists have long disagreed on the racial affinities of the Polynesians. Some have classified them as Mongols, others as Caucasians; while still others have maintained that they are a special race. This in itself is strong evidence that the Polynesians are a badly mixed people, for, whenever there has been a general disagreement as to the racial affinities of any group, it has been found almost invariably that the group was non-homogeneous.

"There is much vagueness as to what constitutes a Polynesian, but as generally conceived and described, he is a tall and remarkably well proportioned type, with a short head, a high and relatively narrow nose, straight or slightly wavy black hair, and a yellowish brown skin.

"In no part of Polynesia from which we have information does this type make up the entire population at the present time. There is strong evidence that in times past, and not so very long past either, this element was entirely absent, or not present in any appreciable strength."

ISLAND WOMEN IMPRESSED EARLY VOYAGERS AS PARAGONS OF BEAUTY

According to Dr. Sullivan, the racial affinity of the Pacific islanders with ourselves is not nearly as close as the romancers assume.

It is undeniable, however, that temperamentally as well as physically the Polynesians seem to share an extraordinary number of traits with people of European stock. The apparent resemblances, together with the charm of their idyllic islands, have combined to endow them with a peculiarly strong attraction for the white men who have come among them during more than two centuries.

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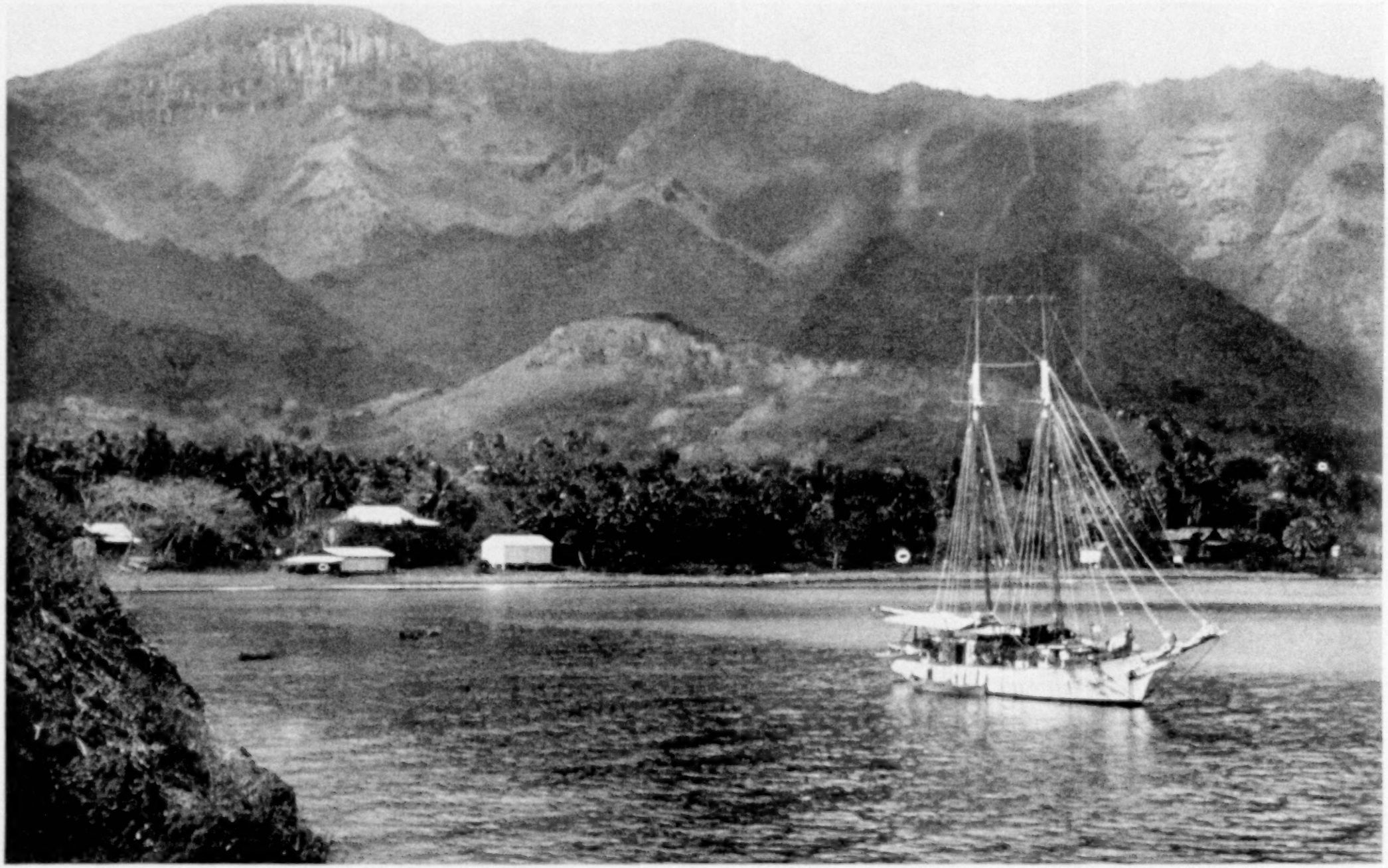

A QUIET ANCHORAGE OFF NUKUHIVA ISLAND

Fourteen miles in length and ten miles wide, Nukuhiva is the principal island of the Marquesas group. There are three safe harbors on the southern side.

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SPIRES OF NUKUHIVA ISLAND FROM HATIHEU BAY

Stevenson has described the vale and bay of Hatiheu as inclosed on three sides by a bowl of mountains, while on the fourth the rampart has been bombarded into ruins. "The interior of this vessel is crowded with lovely and valuable trees—orange, breadfruit, mummy-apple, cocoa, the island chestnut—and for weeds, the pine (pandanus) and the banana. Four perennial streams water and keep it green; and along the dell, first of one, then of another, of these, the road, for a considerable distance, descends into this fortunate valley."

YOUNG TARO AT RAPA

In southern Polynesia the starchy root of this water-growing plant replaces the equatorial breadfruit as the basis of poipoi.

As regards the famed personal attractiveness of the Polynesian women, due allowance must, of course, be made for an almost entirely subjective factor in the early records—the enthusiastic state of mind of European or American seafarers who had been cooped up with companions of only their own sex during voyages many months in length.

The island women would naturally seem paragons of beauty, moreover, to voyagers who had touched *en route* at the Strait of Magellan or at primitive African or Australian havens.

The relative leisure in which most of the women spent their lives, their distinctly "feminine" natures as judged by European standards, and their locally broad and independent views concerning the distribution of their favors, all had effect in creating an impression which has grown into a fetish.

Native ideas of sexual morality were, as a matter of fact, by no means uniform; a reader of Cook, or of any of the other early navigators, will find abundant evidence that originally the freedom observed at certain groups of islands was balanced by rigid ideas of chastity at others.

From Tahiti, and still more from the Marquesas, the tradition of beauty coupled with almost total lack of restriction seems to have pervaded the world. The propaganda, if it may be so called, dates back to Quiros and has been carried on by Cook, Marchand, Krusenstern, Porter, and a host of later travelers, as well as, indirectly, by missionaries and others who could regard no part of the condition without abhorrence.

And yet not one of the early writers gained an inkling of the real significance of native customs which departed from the ethics or the social code of Europe!

The whalemen who visited the Marquesas mainly to take part in debauchery, returned home filled with pious condemnation. More godly sojourners attributed the whole state of affairs entirely to the zeal of the devil.

Krusenstern explains the depravity of young Marquesan women as due to the cupidity of the men of their families, who sought by vicarious means to obtain iron or other useful material from the white

RAPA GIRLS BOUND FOR THE TARO FIELDS

At the right is the end of the white church of Ahurei Bay. The members of the expedition presented a case of kerosene for the mariner's light on this church, and were rewarded by a deluge of gifts from the hospitable islanders (see text, page 425).

MATRONS OF RAPA POUNDING TARO ROOTS, AS THE FIRST STAGE IN THE MANUFACTURE OF POIPOI

The natives of Rapa, as shown by both physical characteristics and their dialect of the Polynesian language, are more akin to the primitive inhabitants of the New Zealand region than to those of the Society Islands.

A DAMSEL OF RAPA WITH A BURDEN OF TARO ROOTS, WHICH SHE HAS CARRIED A MILE ACROSS THE MOUNTAINOUS RIDGES

men. Stevenson, with even greater error, regarded the misdeeds which he records as chiefly a new development resulting from recent degeneration of the inhabitants.

WHITE MAN BROUGHT A PANDORA'S BOX OF TROUBLE TO MARQUESANS

It has remained for modern ethnologists, working without mental bias among the sad remnant of the Marquesans, to demonstrate that the native customs can not justly be summed up and dismissed as mere depravity.

The obvious answer to such a charge is that the ancient code worked too well—that it enabled the inhabitants of the islands to develop through long centuries into a splendid type of savage, who exhibited in marked degree virtues which are a necessary requisite of happy, successful family and tribal existence.

Marriage among the Marquesans, for example, was characterized by quite as much loyalty and affection as among any other primitive people, even though (or perhaps because) the wedded state came rather as an end than as a beginning in the intimate relationships of men and women.

The manner of life, whatever its abstract ethical status, was eminently practical during the period of isolation. With the coming of the white man, however, a Pandora's box of predatory and destructive influences was opened, and the Mar-

A LAD OF RAPA IN HIS TARO-LADEN OUTRIGGER

In a region of amphibious people, the men of Rapa are particularly noted as boatmen (see text, page 425). Of old they were favored as recruits for the Yankee whaling vessels, with the result that to-day there is a preponderance of women in this island's population.

quesans were wiped out before they had received much encouragement to alter their ways.

Readers who are familiar with the sorely misinterpreted record of Polynesian vices owe it to themselves to round out their information by referring to Dr. Handy's admirable study of "The Native Culture in the Marquesas."

A LOYAL, GENEROUS, FRIENDLY, AND IMAGINATIVE PEOPLE

Dr. Handy stresses the democracy and truthfulness of the Marquesans, and attributes to them "loyalty, generosity, and gratitude in friendly personal relationship; a keen appreciation of individual integrity expressed in personal independence with clear conceptions of justice and honor; high refinements, subtleties, and graces in social and æsthetic expression; and capacity for rational and imaginative thought belonging to a very high order of intelligence."

Of such kind were the Pacific people who were among the first to melt away after ships had moored in their roadsteads. "The tribe of Hapaa," wrote Stevenson, "is said to have numbered some 400, when the smallpox came and reduced them by one-fourth. Six months later a woman developed tubercular consumption; and the disease spread like a fire about the valley, and in less than a year two survivors, a man and a woman, fled from that new-created solitude."

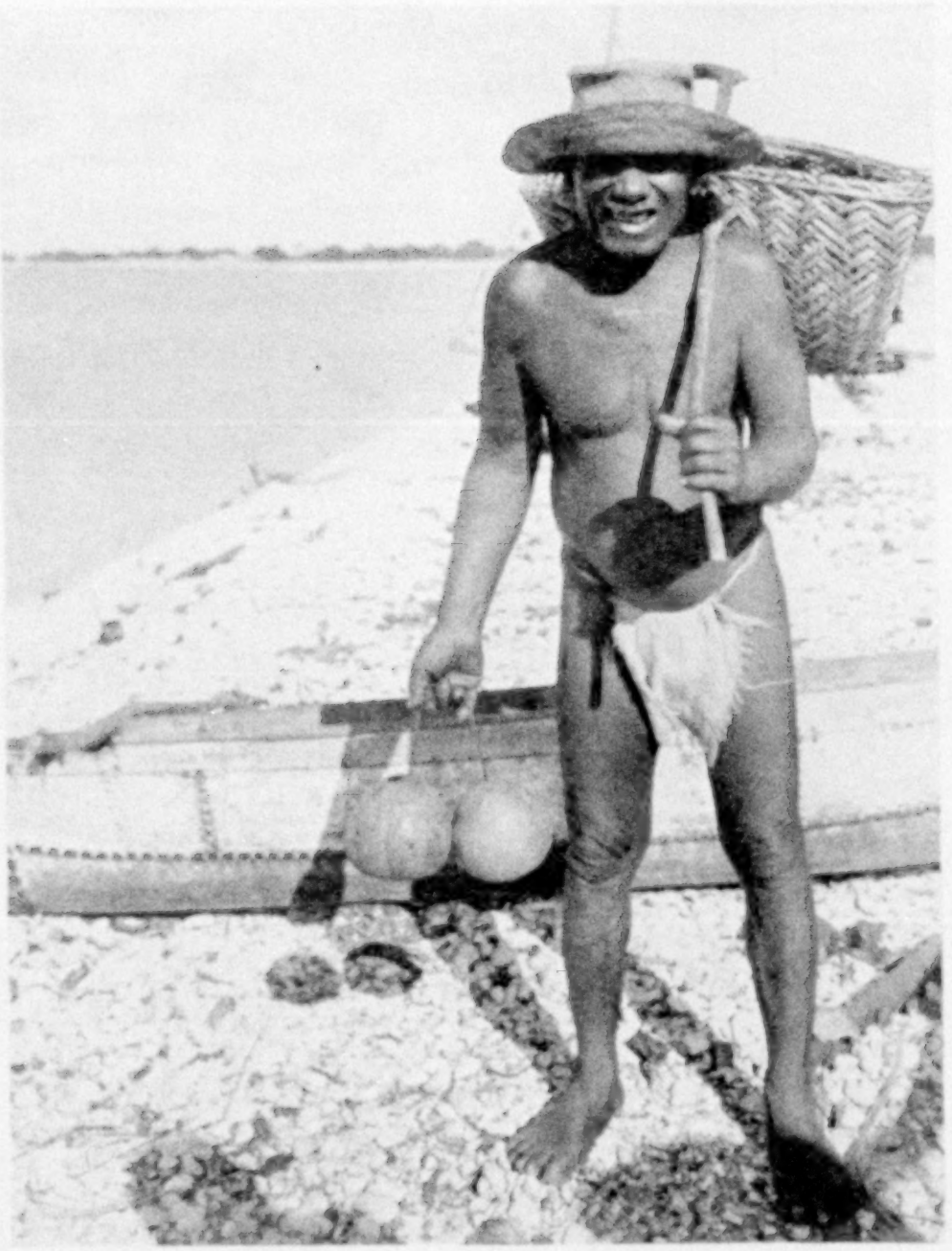
MARQUESANS ARE GRADUALLY DISAPPEARING

To-day the inhabitants of the once populous Marquesas number about 1,800, including a handful of whites and many Chinese mixed-bloods.*

The story is characteristic, for, while the Samoans and certain other islanders have fared better, occasional pestilences, to which they are in nowise inured, still carry away large proportions of the population.

From the days of discovery the Polynesians have been subject to every disintegrating evil. The altruism of a few pioneer missionaries has been unable permanently to stay them.

* See, also, "A Vanishing People of the South Seas: The Tragic Fate of the Marquesan Cannibals, Noted for Their Warlike Courage and Physical Beauty," by John W. Church, in the NATIONAL GEOGRAPHIC MAGAZINE for October, 1919.



TUMANU, AN OLD WARRIOR OF TUREIA ISLAND, TUAMOTU GROUP

His canoe, on the beach of the lagoon, is joined with sennit in the ancient Polynesian manner. The canoes of the Tuamotuans were of such superior make in the old days that the primitive Tahitians dignified them with the name of *pahi*, a term applied only to their own war canoes and to the ships of the white men.

One of the most successful evangelical ventures in the South Seas was that of the early British mission at the Society Islands.

Ellis's record of the years of devoted labor without visible sign of response, and then of the sudden tumbling of the pagan régime as if by divine fiat, makes dramatic reading even for one not interested in the special cause. Whole families, communities, and tribes at Tahiti and the neighboring islands suddenly expressed a desire to become Christian. Within a matter of days or weeks, the old order toppled like a house of cards.

The temperament of the Polynesians seems to be well adapted to acceptance of a literal, one might say a primitive, type of Christianity.

At Pitcairn Island, and in a very few other localities where extraneous influences have not yet obliterated it, the simple and fervent religious life, naïve and unashamed, recalls descriptions of the church in patriarchal times.

THE WHITNEY SOUTH SEA EXPEDITION

The preceding brief account of the history of discovery in Polynesia, and of the profound changes which are still taking place, points to the importance of further scientific investigation.

Opportunities now existing must be seized within the span of the present generation or they will slip away irrevocably. This is the reason for the intensive activity of the Bishop Museum, of Honolulu, in many branches of Pacific research, as well as for the contemporary work of the American Museum of Natural History.

Five years ago, Mr. Harry Payne Whitney agreed to support for the American Museum a notable project in the Pacific. The choice of a leader in the field was fixed by virtue of former accomplishments upon Mr. Rollo H. Beck, a veteran exploring naturalist who had previously served on expeditions in South American waters and elsewhere. Thus the Whitney South Sea Expedition was launched.

After a reconnaissance of Tahiti and of

several adjacent parts of Polynesia, Mr. Beck purchased the auxiliary schooner *France*, a step which made the expedition independent of sailing schedules and trade routes.

The *France* has since visited more than 100 islands of the Society, Marquesas, Tuamotu, Austral, Cook, Samoan, and Fiji groups.

Collection and study of the birds of the South Seas have been the primary objects (see text, page 394), but many other animals and plant specimens have also been obtained. Photographs illustrating the environment, the animal life, and the appearance and customs of the human inhabitants, have been taken. Especially valuable are the camera's records of those localities—regrettably numerous—in which the state of the fauna and of the people is still altering materially in response to external transformations.

A MAN OF MOOREA, SOCIETY ISLANDS

This stalwart native is carrying two bunches of fei, or mountain bananas, and his fighting cock. Heavy loads of fei are carried down many miles from the upland forests.

Some idea of the extraordinary industrial activity occasionally undertaken in even the most out-of-the-way islands may be gained from a description of a pearl-diving season.

AMONG THE PEARL DIVERS

The opening of this great event in the French colonies comes in July. Since diving is not permitted during successive years at the same island, all gear, stocks of merchandise, and building material must be taken to new islands in annual rotation—no small undertaking when it is remembered that a coral atoll which normally supports perhaps 200 persons, may become during the diving season the abiding place of thousands.

The following quotation is from a recent press account:

"This year the open island is Hikueru, one of the Tuamotus, 400 miles to the eastward of Tahiti. Already this lonely atoll is taking on a metropolitan appearance. The profits to be gained come not only from the pearl-shell won from the lagoon, but from the sale of all kinds of wares dear to the native heart and from the providing of entertainment to refresh the weary diver and his women folk after the labors of the day are over.

"The average native diver wins a good

A DANCING GIRL OF TAKAROA

The Manchester cotton prints have long since replaced the native tapa, or bark cloth.

sum from the bottom of the lagoon and much of it goes on expensive silk dresses for his wife and daughters, on the delectable canned goods of the *popaa* (white man) and on the movies.

"This year there are to be, it is said, three moving picture theaters, any number of motor cars for hire—the length of the roadway in Hikueru is less than a half mile, but that apparently makes no difference—a brass band, and, it is reported, electric lights along the Great White Way of this little ring of coral sand.

"Late advices indicate that the season this year at Hikueru will be the most active in many years. It is estimated there will be at least 1,000 divers at the island. These, together with their families and the traders with their staffs, will swell the population of the island during the season to nearly 4,000."

The effects of such concentration upon the breeding birds and other forms of indigenous life are easy to imagine!

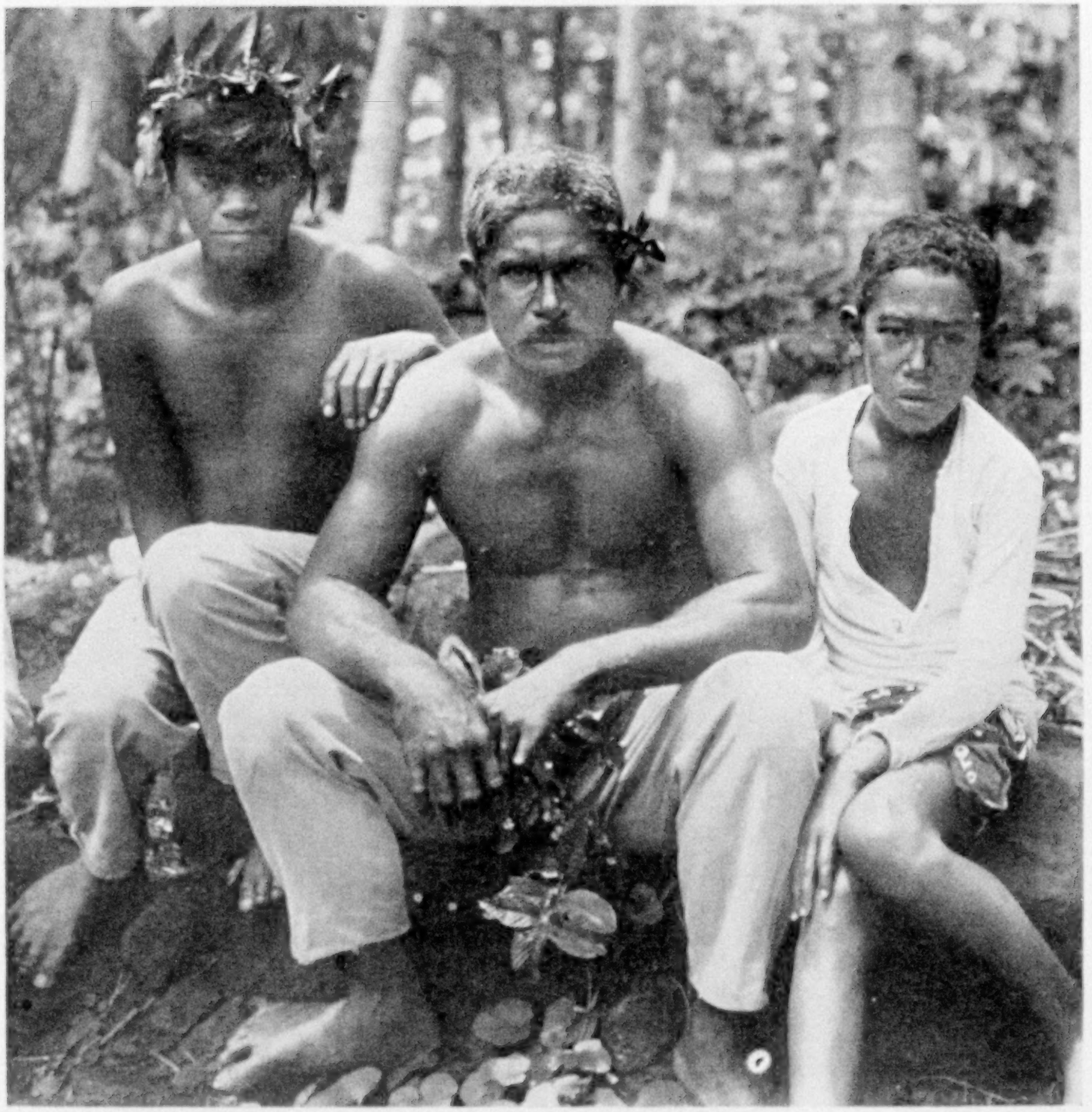
After the preliminary field work at Tahiti, in 1920-21, Mr. Beck and his companions sailed northward to Christmas

THE CALL TO SUNDAY SCHOOL, FAAITE ISLAND, TUAMOTU GROUP

A cotton jacket over the pareu (see Color Plate VI) and a straw hat make up this lad's Sabbath attire.

YOUTHFUL FISHERMEN OF RURUTU ISLAND, AUSTRAL GROUP

The children of Polynesia have always been treated with great tenderness. The early missionaries, who looked at nearly every custom askance, recognized the primitive islands as a children's paradise. Destruction of new-born infants was, to be sure, extensively practiced in the Society Islands and elsewhere, but this evil had its root in overpopulation and periodical food shortage.



FATHER AND SONS ON THE MARQUESAN ISLAND OF TAUATA

The Marquesas Archipelago has long been famed for the fine physique of its people. The wearing of wreaths, and of flowers in the ears, is a widespread custom in Polynesia.

Island, where Pére Rougier operates great coconut plantations.

Then the *France* made the first of three visits to the romantic Marquesas. Then far southward among the Austral Islands, removed somewhat from the blight of civilization, and on to lonely Rapa, the "Uttermost Thule" of the Pacific, renowned for peerless sailors and interminable hospitality (see pages 419-425).

Next, eastward to isolated Pitcairn, where the descendants of Commodore Bligh's seamen, who fled into oblivion after the notorious *Bounty* mutiny of 1790, were found happy, law-abiding, and devout, suffering not at all for the stormy sins of the fathers (see, also, page 392).

After reaching her easternmost goal at Ducie Island, the *France* turned again toward Tahiti by way of the thickly strewn Tuamotus, sending ashore her boats at every rock or palm-green strand.

FOLLOWING THE "FRANCE"

While we cannot keep in the wake of the *France* within the brief scope of this article, we can skip about among the Polynesian isles by drawing upon the voluminous notes of Mr. Beck and his comrades, Messrs. Ernest H. Quayle and

José G. Correia, recording some of their impressions and comparing these with experiences of earlier pioneers.

Upon landing in Tahiti, the members of the expedition arranged with two native guides for a trip into the interior. On the morning of October 11, they left Papeete by motor, a pleasant ten-mile ride along the western coast of the island, to the mouth of the Punaruu River, where the guides were to join them.

Minas were calling loudly from the tops of the taller trees; terns were sailing over the smooth lagoon, and migrant shore birds whistling on the beach; while the steady boom of breakers on the barrier reef offshore was mingled with the rustling of near-by coconut fronds.

LITTLE MAIDENS OF TAUATA ISLAND

The sweet Marquesan smile has captivated all visitors from the early days of Pacific discovery.

Interspersed with neglected palm groves were little patches of finely cultivated ground where Chinese gardeners, the inheritors of Polynesia, raised in rigidly straight rows the various vegetables for which they found a market in Papeete.

When the car reached the Punaruu River, the luggage was soon transferred into four sacks which were swung on poles borne on the stalwart shoulders of the islanders. The latter then led the way along the trail which wound into the gorge of the Punaruu. At its mouth this canyon was half a mile in width, but it narrowed rapidly to 100 yards, with precipitous walls on either side.

Three miles from the entrance the party came upon a small tract where an industrious native had cleared off a bit of the steep, rocky hillside, and had planted it with papaya trees which were laden with green fruit.

Wading back and forth across the stream as one side or the other seemed to offer the smoothest trail, the travelers after three hours turned out of the main gorge and picked their way along a rivulet that trickled down between yet narrower walls. Stopping by a shady pool, Tafia, the head guide, dropped his burden and pointed up the left cliff to indicate the route.

A faint trail led skyward, so, after a leisurely lunch, they began the thousand-foot climb, finally surmounting the precipice near a group of welcome coconut

COOLIES AT WORK IN THE PHOSPHATE BEDS OF MAKATEA

The richest of the Pacific's many phosphate islands is Nauru (see the NATIONAL GEOGRAPHIC MAGAZINE for December, 1921).

POLYNESIAN MASONS

They are rebuilding with coral blocks the wall of the church on Tureia Island. The mortar trenches suggest small canoes.

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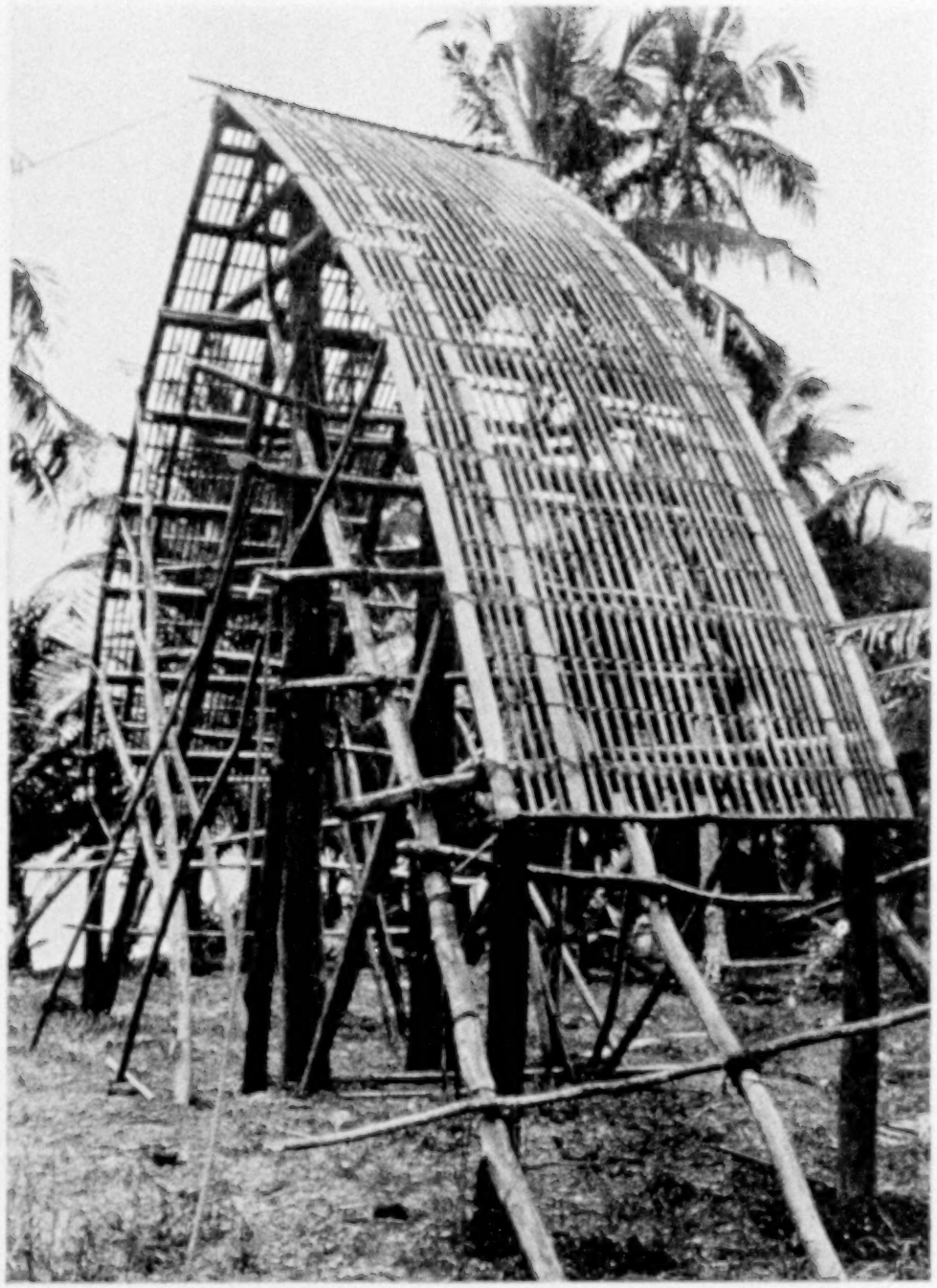
A FISHING CANOE OF AMERICAN SAMOA, WITH SHELLS DECORATING PROW AND STERN



A STAGE IN THE ERECTION OF A SAMOAN RESIDENCE, ISLAND OF OLOSENGA

MEN OF PITCAIRN, AHOY!

The male population of one of the most romantic spots on earth is seen coming out to visit the *France*. The treasured whaleboat could have come from nowhere on earth but Buzzards Bay.

A RESIDENCE OF PITCAIRN, THE VERITABLE PROSPERO'S ISLE OF THE "BOUNTY" MUTINEERS

Pitcairn was discovered by Carteret on July 2, 1767, but the foundation of its fame dates from Bligh's famous voyage in the *Bounty*, 20 years later. The mutiny is one of the most blood-stirring and most often told romances of the sea. The present inhabitants are descendants of the mutineers. They are of mixed blood, but in appearance the Caucasian features predominate. They are notable in Polynesia for virtue, piety, supreme contentment with their island home, and for a simple, patriarchal type of Christianity.

palms. After a draught of fresh coconut milk and a few minutes' rest, they started forward again through the gloomy forest, emerging at a grassy depression where a few golden plovers, recent arrivals from far-off Alaska, were resting about the borders of a small pond.

A mile beyond the pond they halted beside a brook for the night. The scarcity of birds during the first day was attributed by Mr. Beck to the rain which had fallen in frequent showers.

A PIG IS COOKED IN TAHITIAN STYLE

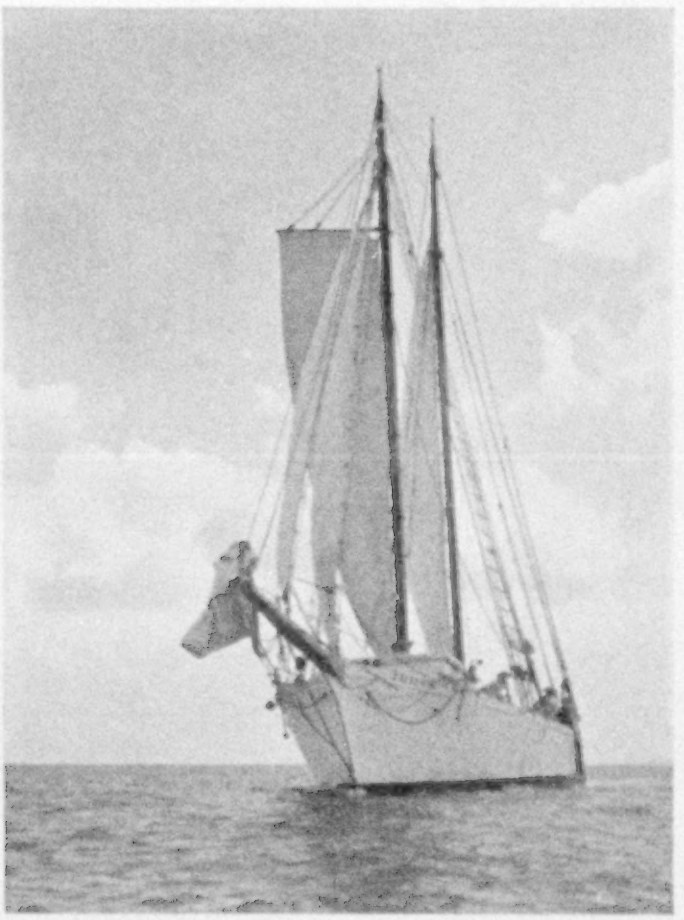
The next morning was bright and hot, so it was decided to hunt for the day in the vicinity of camp.

Tafia accompanied Mr. and Mrs. Beck toward the foot of towering cliffs which bounded the plateau to the eastward. Before reaching the base of the cliffs, they began to note roughly built stone walls which supported terraces of earth against the hillside. Dozens of these structures were observed during the course of the day.

An occasional cooing dove or chittering kingfisher was heard though seldom seen in the tall trees which reared above the lower tangle of brush. Game seemed scarce, but while the naturalists were enjoying some juicy oranges at the base of the tree out of which the guide had dropped them, a wild pig was attracted to the spot by the thud of falling fruit. Hastily slipping a heavy charge into his fowling piece, Mr. Beck added the unlucky porker to the larder.

Tafia, all smiles, at once began to break up twigs and branches, and, after piling them carefully together, fired the heap. Next he inclosed the flames with chunks of lava and, as the fire began to burn well, piled on still more rocks. Within ten minutes conditions seemed to be to his liking, so he took the pig and pulled it rhythmically back and forth over the heated stones.

In a short time clear patches appeared on the scratched surface; a little more rubbing, and a few deft pulls with his fingers under the legs and about the ears, completed the depilating process. It was astonishing to watch a dirty, bristly, brindle pig become a clean, smooth, white-skinned carcass.



THE SCHOONER "FRANCE" LUFFING TO PICK UP THE COLLECTOR OF SEA BIRDS

Within less than half an hour from the time the victim had walked to its fate, Tafia was carrying the bristleless body campward.

After this exhibition of Tafia's skill, he was instructed to cook the animal in the ancestral Tahitian manner.

The meat was accordingly cut into convenient pieces and thoroughly washed in the brook. Then it was placed on a thick layer of green leaves above a pile of rocks which had been heating for some time. Another layer of leaves was laid over the meat, and the whole covered with stones.

CATS ACCUSED OF DESTROYING BIRDS OF TAHITI

When supper-time came the appetizing food was removed. After the choicest parts had been eaten, the remainder was cut from the bones, and rammed into three large, green bamboo segments. These were laid on the still hot stones, covered once more with leaves, and taken out next morning, deliciously cooked, to furnish all with meat rations for the next three days.

Thus, by employing the principle of the fireless cooker, do the Polynesians pre-

A HUNGRY CHICK: NESTLING MAN-OF-WAR BIRD OF MARIA ISLAND: TUAMOTUS

pare dishes which for economy and toothsomeness cannot be excelled.

The next camp, built against a great overhanging rock and well roofed with the leaves of a mountain tuber, was not altogether proof against the tropical downpour that assailed the party during the first night beneath it.

First in one place and then in another, the dripping wetness would strike through; a shift of position would be made, and then a wait for the next leak.

The little brook, 20 feet below, which had been dropping in tiny rapids and cascades from one shallow pool to another, changed its placid murmur to a lusty rumble as it rolled stones along its bed and carried down the heavy volume of water from the reeking watershed.

A sunny morning dried the moisture on the foliage, but the search for birds was again disappointing. Two or three Tahitian crag-swallows flying back and forth in the dark shade of orange trees, a pair of noisy kingfishers pursuing insects instead of perching above the water with an eye for finny prey, and companies of the boisterous, introduced minas, comprised the species seen.

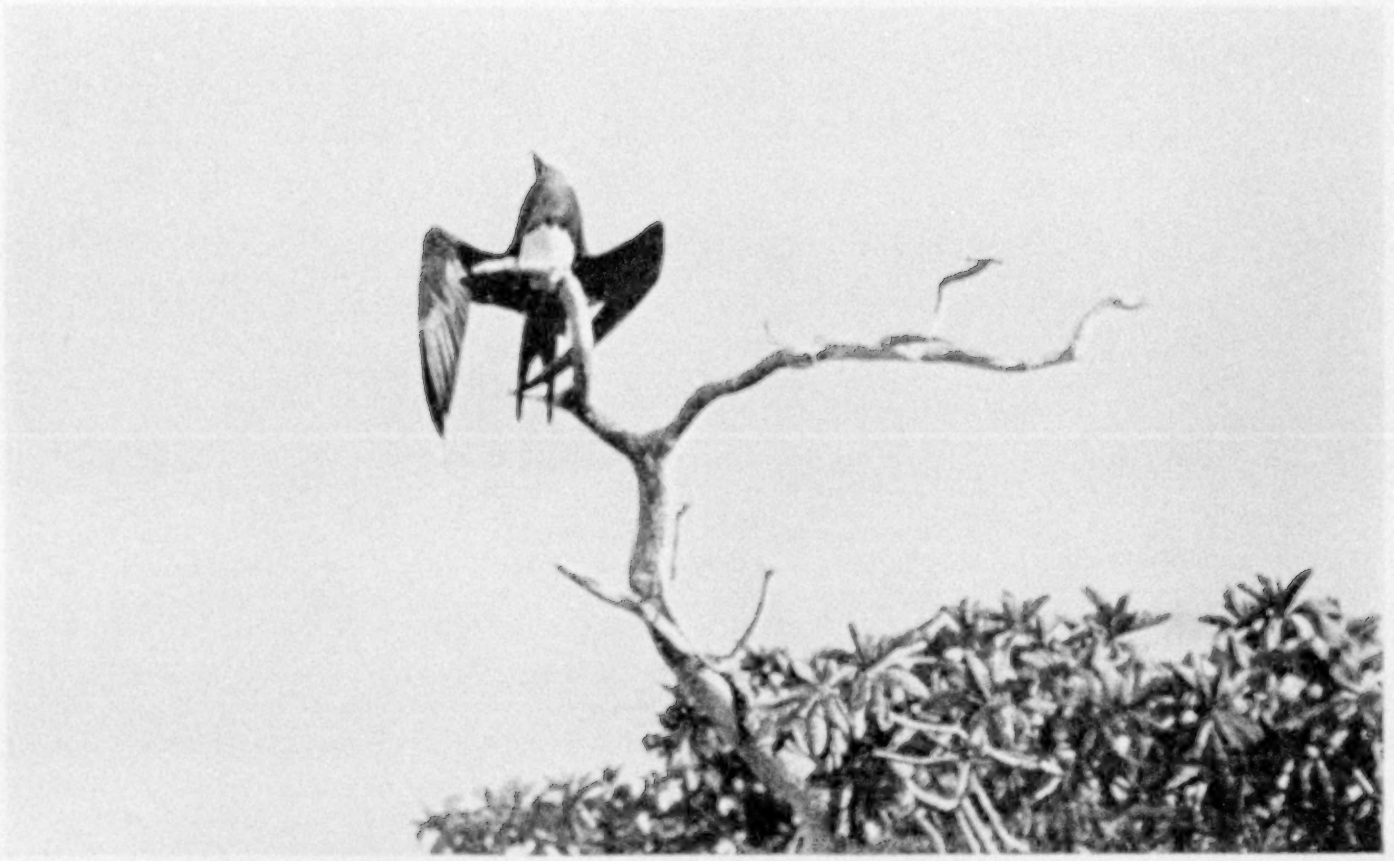
The negligible number of native birds in so seemingly favorable an environment was new in Mr. Beck's experience. One could hardly believe that the rats, which are such a pest in the lower parts of the island, had destroyed the nests of the native birds while permitting the imported minas and weaver-finches to increase.

It seems more likely that cats, running wild for a century, may have exterminated several of the ground-living species which were formerly found in these mountains.

As the guides had assured Mr. Beck that they knew where shearwaters nested close under the cliffs of the highest peaks, the journey inland and upward was continued. The trail led past well laden orange and lemon trees, beneath which were thick tracks of the wild hogs.

Camp was made near the famous Diadem (see page 359), and here, at an altitude of 2,700 feet, the roof was shingled with the great leaves of the fei, the plants of which grew by hundreds all about.

Few ripe clusters of these wild bananas were observed, for native carriers had



A RESTING MAN-OF-WAR BIRD OF DUCIE ISLAND

DIVESTING A TROPIC BIRD OF ITS DECORATIVE RED PLUMES WHILE IT STICKS TIGHT TO ITS EGG

This bird can neither perch nor stand up. It nests on the ground and must shuffle away on its breast before taking flight. The long, red tail plumes of this tireless flier (see Color Plate XII) have always been prized ornaments of the South Sea people. Islets where the birds nested in good-sized communities were formerly monopolized by Polynesian rulers as sources of wealth.

A LARGE MOUTHFUL

A Tuamotuan purple-crowned fruit pigeon accepting a berry from the captain of the *France*.

recently visited the groves and had trundled the weighty bunches down a 10-mile trail to the coast, where they could be marketed at about 10 francs apiece.

A VAST PLATFORM WHERE CEREMONIAL DANCES WERE ONCE HELD

A two days' hunt in nearly unscalable mountain country, where the rope was more than once necessary for the safety of the climbers, revealed only a few deserted burrows of the hoped-for ocean birds.

Leaving the camp near the Diadem, they hiked down a sharp ridge, penetrating a canyon which opened into the main watercourse from Mont Orohena, highest peak of the Society Islands.

Following down the brawling stream, they soon reached a rockbound waterfall, and it became necessary to scale the straight bank and scramble over the spur that descended between converging rivers.

Atop the spur was a vast square platform of hewn rock, formerly the scene of ceremonial dances and other impressive pagan rites. A more inaccessible site, under present-day conditions, would be hard to imagine, but when the coast below teemed with human inhabitants it may have been otherwise.

A few more days of camping and hunting among the thick ferns and bamboo brakes of the lower upland basins, and the party returned to the mouth of the Punaruu. To ornithologists the trip was not

MAN-OF-WAR BIRDS PERCHED HIGH ABOVE THE SHIMMERING PACIFIC: EIAO ISLAND, MARQUESAS

During the mating season the male man-of-war, or frigate, bird wears an inflatable sack of flame-red at his throat, a sort of toy balloon, with which he lures the female bird to the nesting site which he has chosen. (See, also, "Bird Life Among Lava Rock and Coral Sand," in the NATIONAL GEOGRAPHIC MAGAZINE for July, 1925.)

RED-FOOTED BOOBIES AND THEIR NESTS: HATUTU ISLAND, MARQUESAS

Two members of the booby family, the brown- and the blue-faced, lay their eggs on the ground, but the red-footed species, like the man-of-war bird, nests in trees.

highly satisfactory, but to those who appreciate the incomparable mountain loveliness of "la Suisse Tahitenne" it left nothing to be desired.

EXPLORING A SOUTH PACIFIC ISLAND IN A FORD

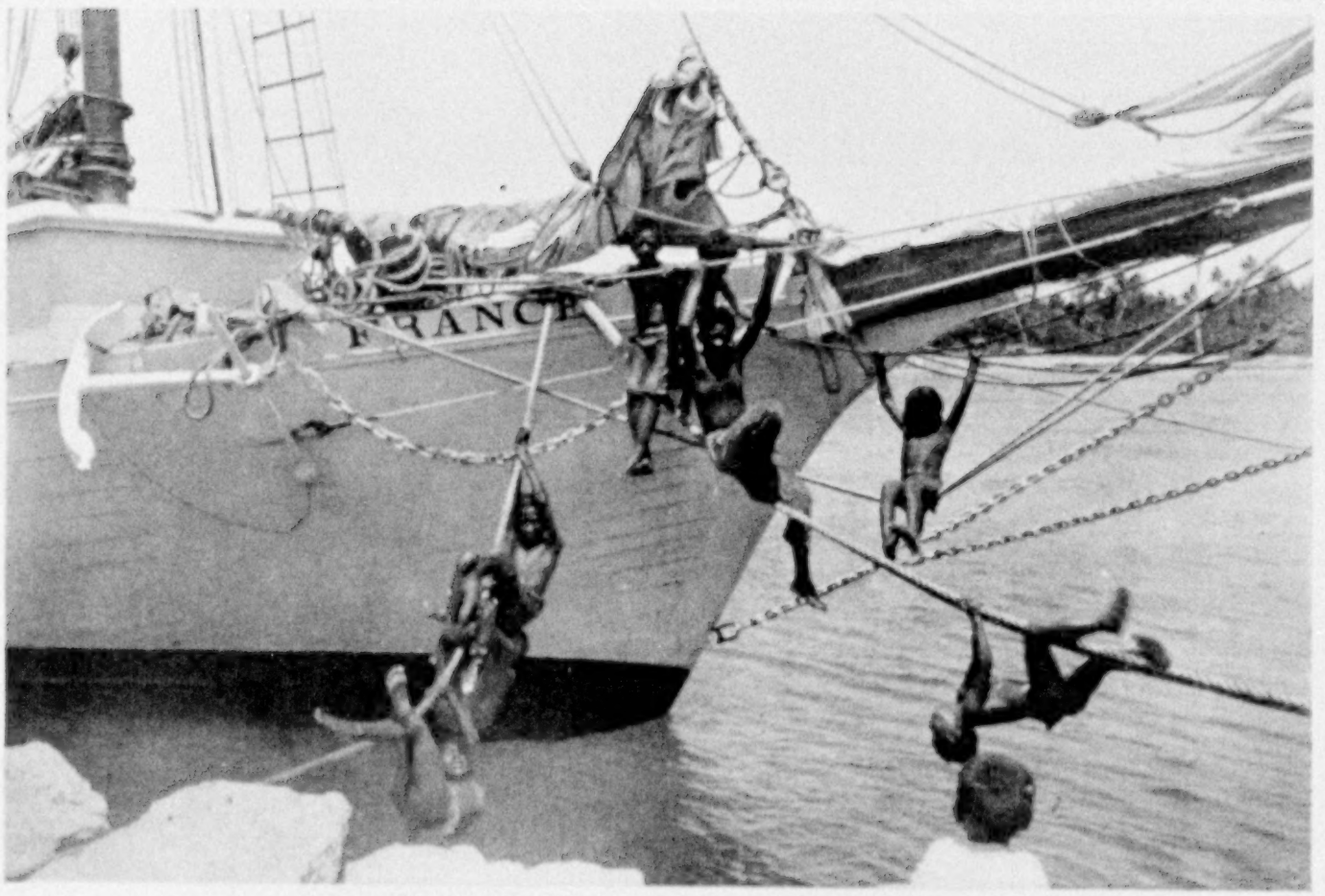
In January, 1921, Messrs. Beck and Quayle made the voyage to Christmas Island, north of the Equator, where, in sharp contrast with the Tahitian field work, they conducted their hunting in a Ford!

The first view of Christmas Island was of two or three distant sand hills. It was obtained several hours after the vessel should have been at the center of the island, if the skipper's morning observations were to be credited! Discounting the astronomical calculations, they had been sailing steadily westward, knowing by the constantly increasing numbers of seabirds that they were heading on the right course.

Just before dark the mate climbed to the masthead and reported land both dead

THE PRECARIOUS NEST OF A FAIRY TERN

The most delicately beautiful of all sea birds (see illustration, page 401) deposits its single egg on the rough bark of a horizontal limb, upon a broken stub or even on the shaft of a palm frond.



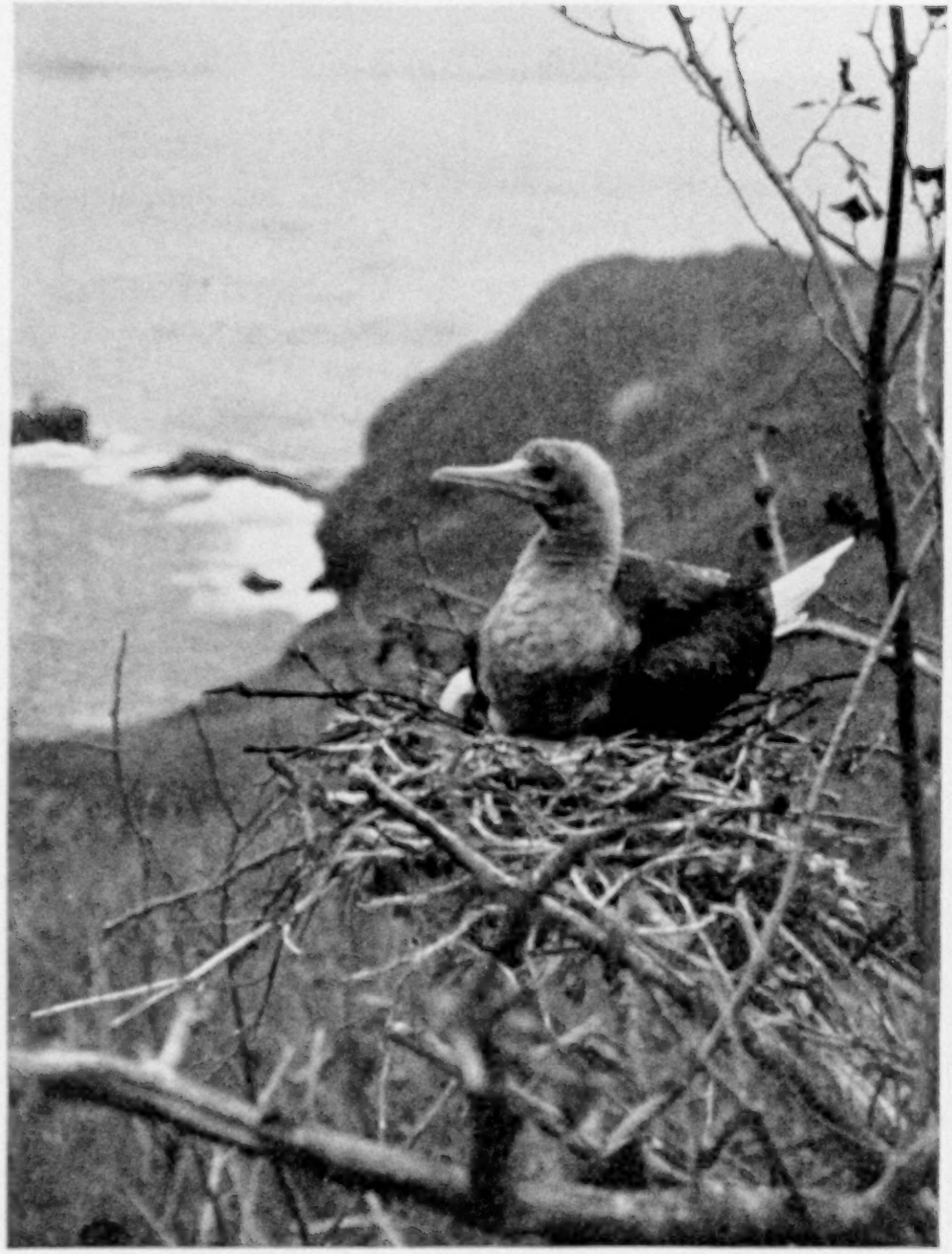
AFTER SCHOOL HOURS AT MANIHI

The native boys used the *France* and its hawsers as a gymnasium.

SOOTY TERNS ABOVE THE GREAT BREEDING COLONY OF KAUEHI ISLAND: TUAMOTUS

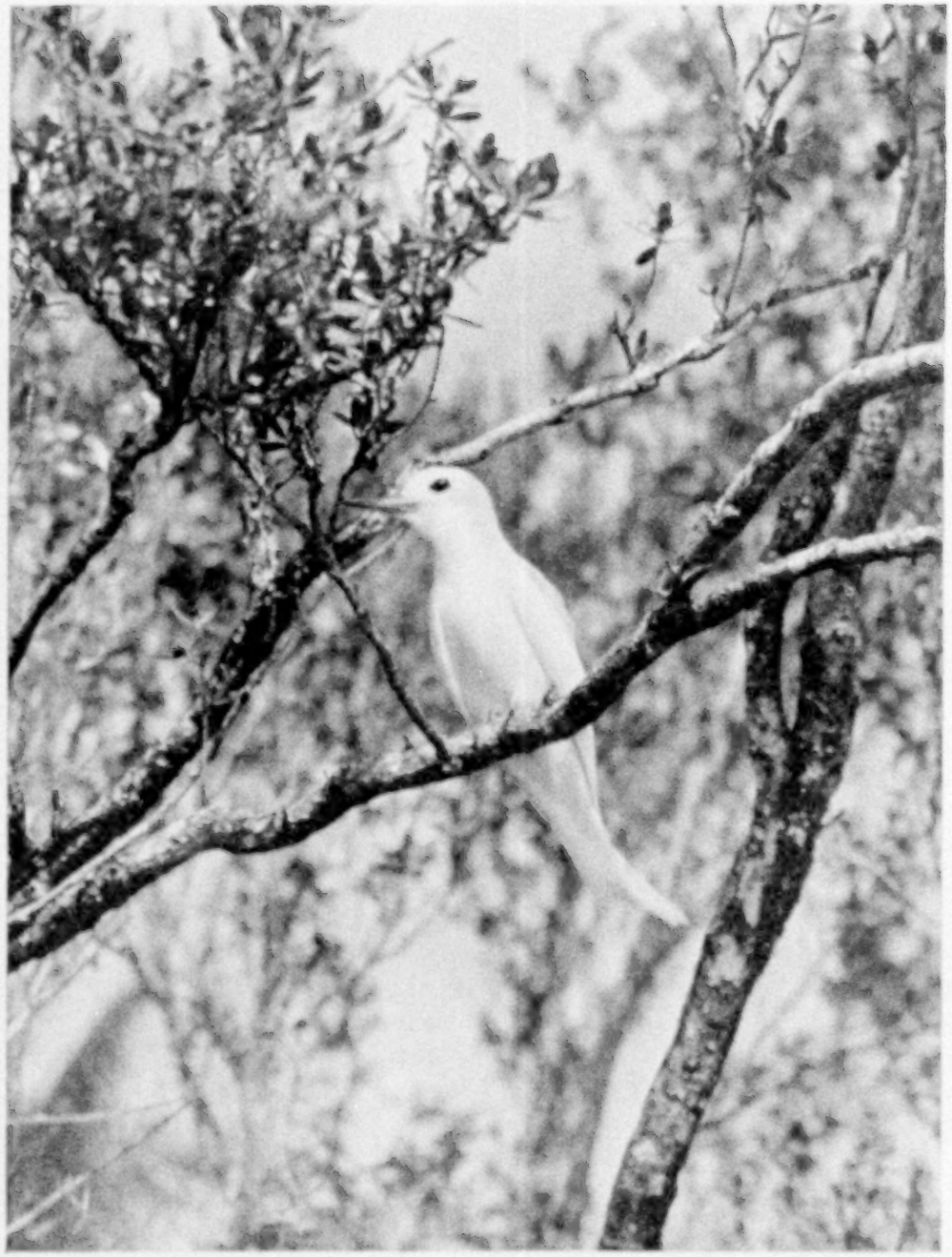
These birds (*Sterna fuscata*), familiarly called "wideawakes," are so numerous that Yankee whalemen, who were accustomed to gather the eggs for food, reckoned the population by "acreage" rather than by numbers, and so recorded the extent of the colonies in their log books.

XUM



PORTRAIT OF A RED-FOOTED BOOBY SHELTERING HER CHICKS

This is a long-tailed, perching species and the only Pacific booby which builds its nest in trees.



A FAIRY TERN, THE LOVELIEST OF SEA BIRDS

The adults of this species are snow white, with dark bills and feet and extraordinarily large eyes.

ahead and on the starboard bow. They then realized that they were off the treacherous bight on the eastern coast of the island.

On account of a strong ocean current, a sailing vessel in a light breeze has little chance of beating out of this pocket if she has entered more than a short distance. So sails were trimmed, the motor started, and the schooner stood offshore until the approach of daylight.

Later in the day the *France* moored at the spot where Captain Cook had first dropped anchor on Christmas day, 1777.

At six o'clock on the following morning the naturalists were rowed ashore and found a dark-skinned chauffeur awaiting their pleasure at the wharf.

To watch boobies, man-of-war birds, several species of terns, and many other birds from the breezy front seat of a Ford, which had neither a top to obstruct the vision nor a windshield to block camera or gun, was hardly to be anticipated when starting for remote and rarely visited islands in the South Seas (p. 364).

A short stretch of elevated coral rock near the settlement of the copra workers had required paving, and the readiest material had evidently been coconut fronds. At low speed, the Ford negotiated this strip very handily. Thereafter it proved good going for 20 or more miles, although at one or two crossings over narrow isthmuses the bristling coral looked dangerous for tires.

For a few miles after leaving "London," the port of Christmas Island, the road wound through endless series of coconut groves, and the skill of the Polynesian driver in missing most of the fallen nuts which dotted the roadway gave constant cause for wonder.

Whenever the wheels struck a glancing blow, the nuts shot to one side—and how the land crabs scurried! At the approach of the machine many of these crustaceans would dodge into holes, but occasionally one would stand ground and raise threatening claws.

BIRDS WITH "TOY-BALLOON" THROATS

In low bushes along the way, sometimes only a foot or two above the ground, the man-of-war birds were occupying loosely built nests. Three or four of the red-pouched males were often seen sitting together on a shrub, with wings extended and heads pointed skyward toward some soaring female. Their distended throat sacs looked like toy balloons, and when such birds were driven from their perches, they seemed to find difficulty in carrying the encumbrance, and would travel on an uneven keel until the sac collapsed.

Male birds appeared greatly to outnumber females. Whenever one of either sex was frightened from its nest, a strange male was always likely to swoop down and settle contentedly on the egg, whereupon the presumably rightful owner would make vicious but vain lunges at the intruder.

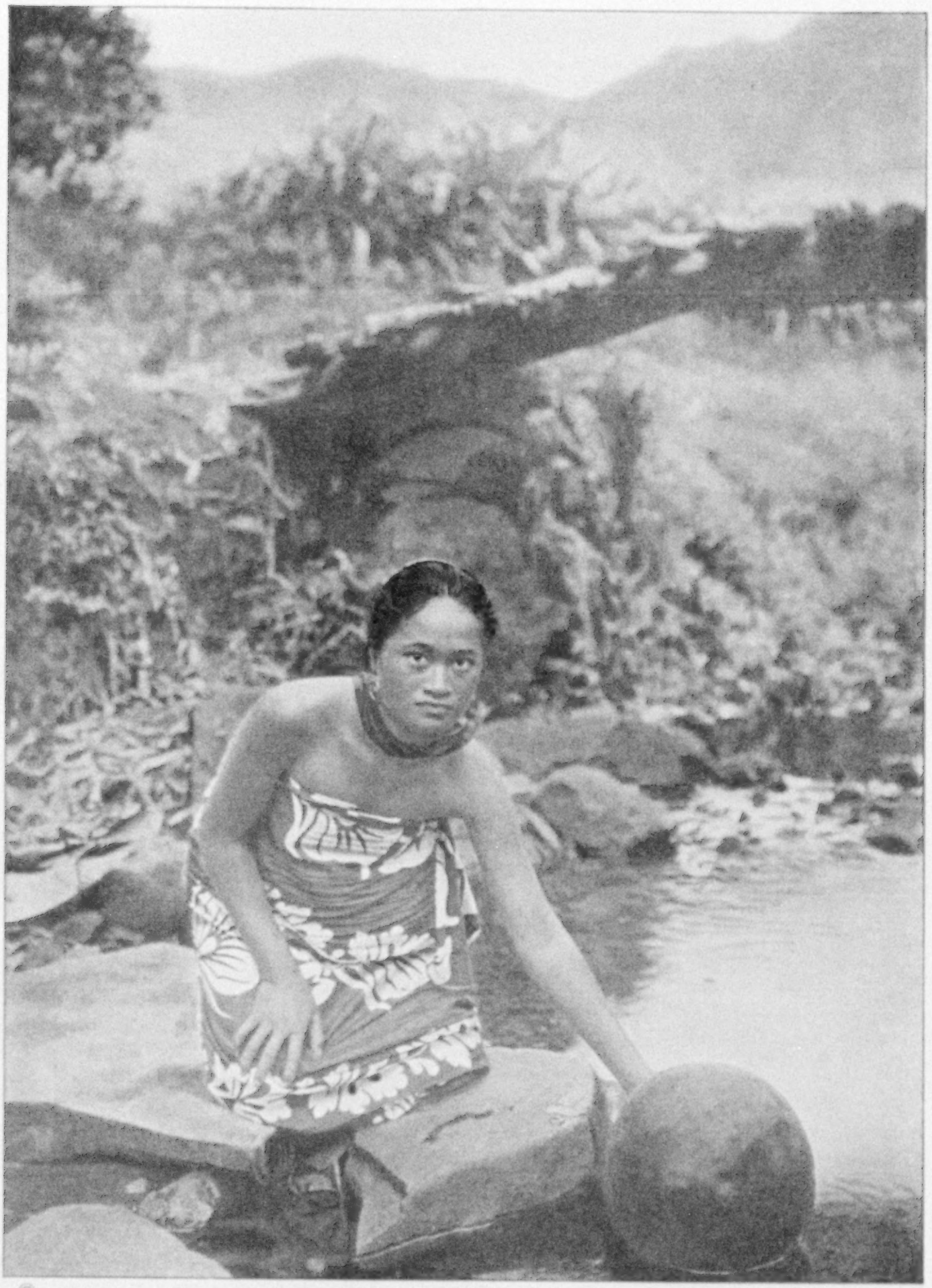
CHRISTMAS ISLAND HAS UNIQUE WARBLER

At many of the islets or motus in the great lagoon of Christmas Island, large breeding colonies of petrels, tropic birds, terns of *seven* species, and other rare water birds were found. The only land bird of the island—the *kokikoko*—a little gray warbler found nowhere else in the world, and not previously represented by specimens in any museum, was also collected.

The sooty terns of Christmas Island range regularly 150 miles out to sea from their nesting colonies. The island, which looms but a few feet above sea level, can hardly be visible to the birds at a greater distance than 20 miles. Although many do their fishing inside this range, flocks of from 10 to 300 go several times farther. That the darkness of night has no perceptible effect upon their coming and going, is evidenced by their creaking cries, which one can hear as they pass a ship.

Even the combination of darkness, dense fog, and drizzly rain does not prevent sea birds from finding their nests, as is proved by the fact that several kinds of petrels select the thick forests of high islands in which to dig their burrows, and then depart from and return to them only at night.

At several members of the Marquesas Group and at the majority of the 51 islets of the Tuamotu Archipelago visited the members of the Whitney Expedition were the first naturalists ever to make zoölogical observations of any description. What changes, incidentally, their notes reveal,



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Photograph by Rollo H. Beck

A MAIDEN OF RAPA, AUSTRAL ISLANDS

Papote, filling her gourd at the brook, as her forbears have done from time immemorial.

©

Photograph by Rollo H. Beck

A SEA-BEATEN GLEN OF THE MARQUESAS

Omoa Valley, in the small island of Fatuhiva, the essence of all that is loveliest in the isles of the South Seas.

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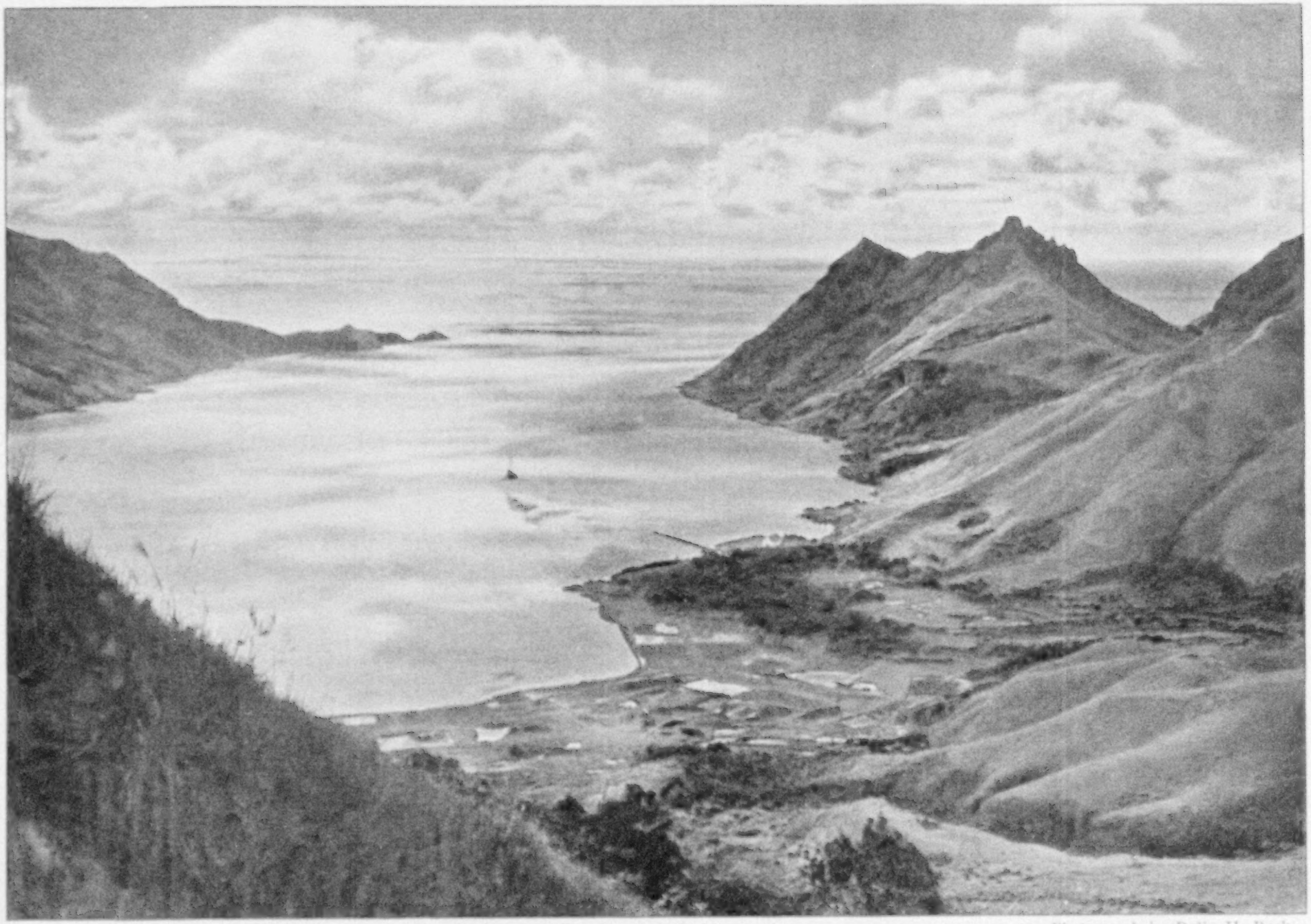
Photograph by Rollo H. Beck

TAIOHAE BAY, NUKUHIVA ISLAND

A characteristic scene on the dry or leeward coast of one of the Marquesas, with copra and trading schooners at anchor.



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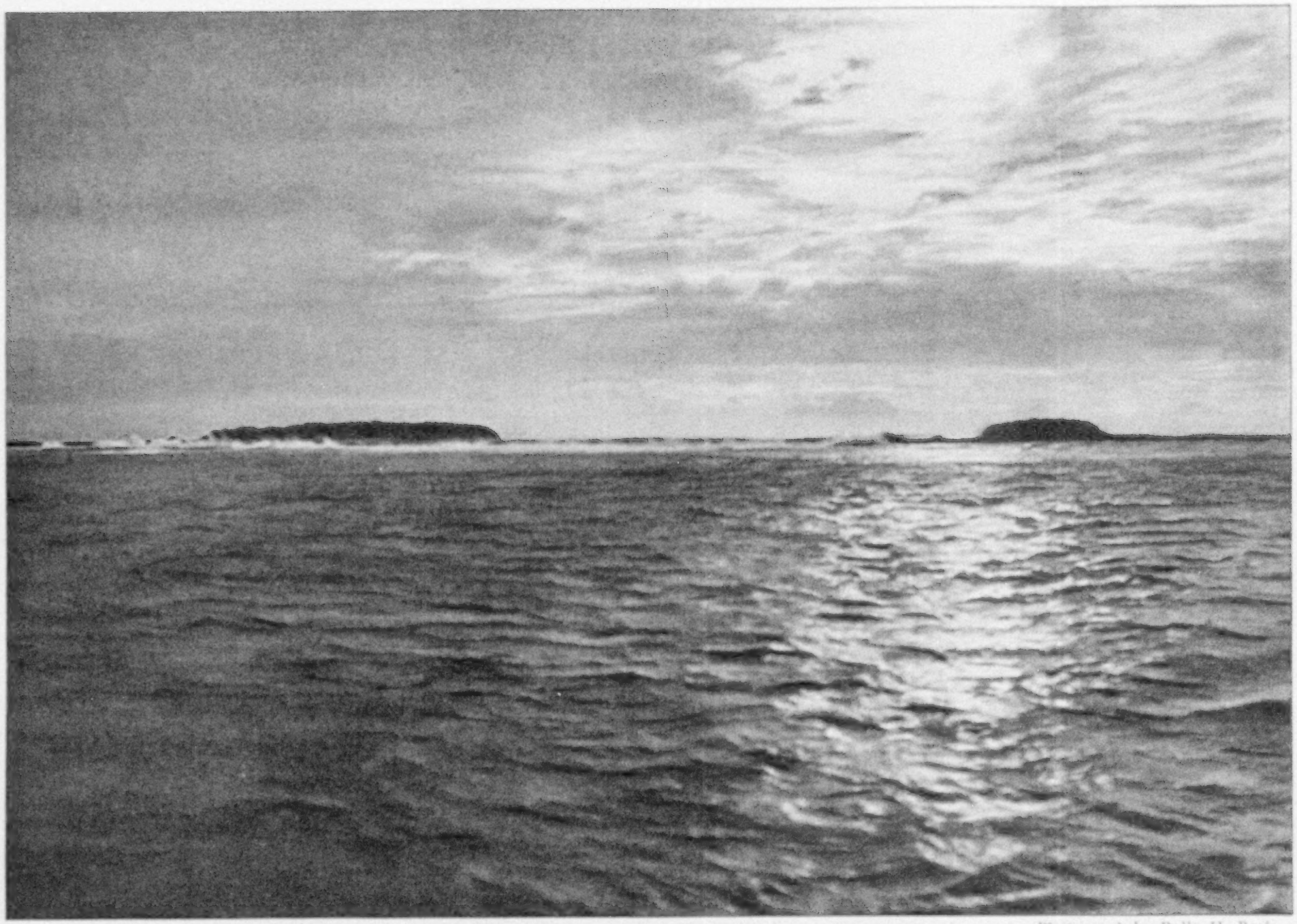
A HAVEN IN DISTANT RAPA

Ahurei Bay, the harbor of Rapa, southernmost island of eastern Polynesia. Beds of taro, whose roots are a food staple in the South Seas, gleam on the narrow plain at the head of the bay. Beyond the grove are the stone pier and the community church, the Whitney Expedition schooner at anchor, and the bright Pacific stretching eastward.



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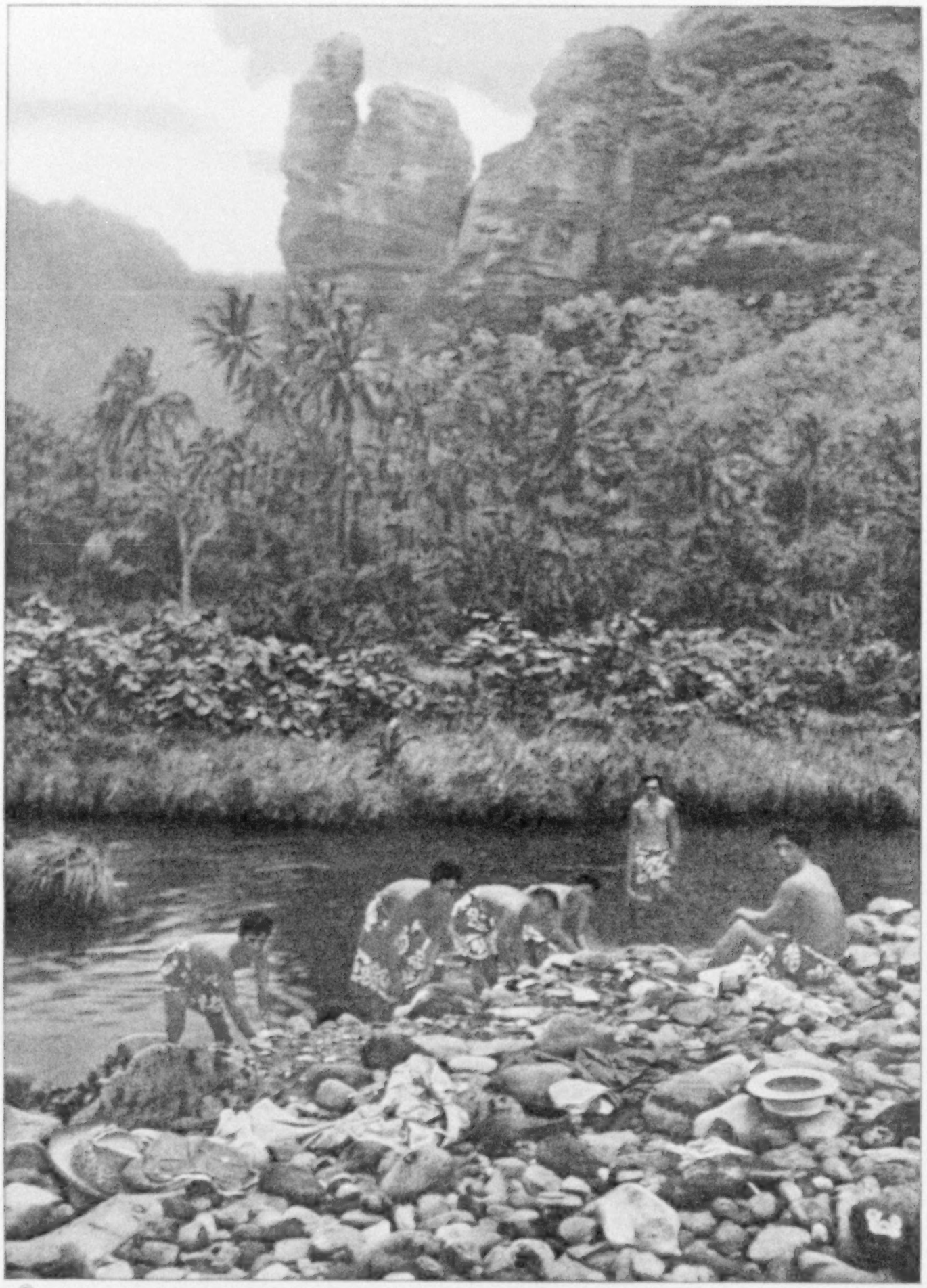
LES ÎLES DANGEREUSES

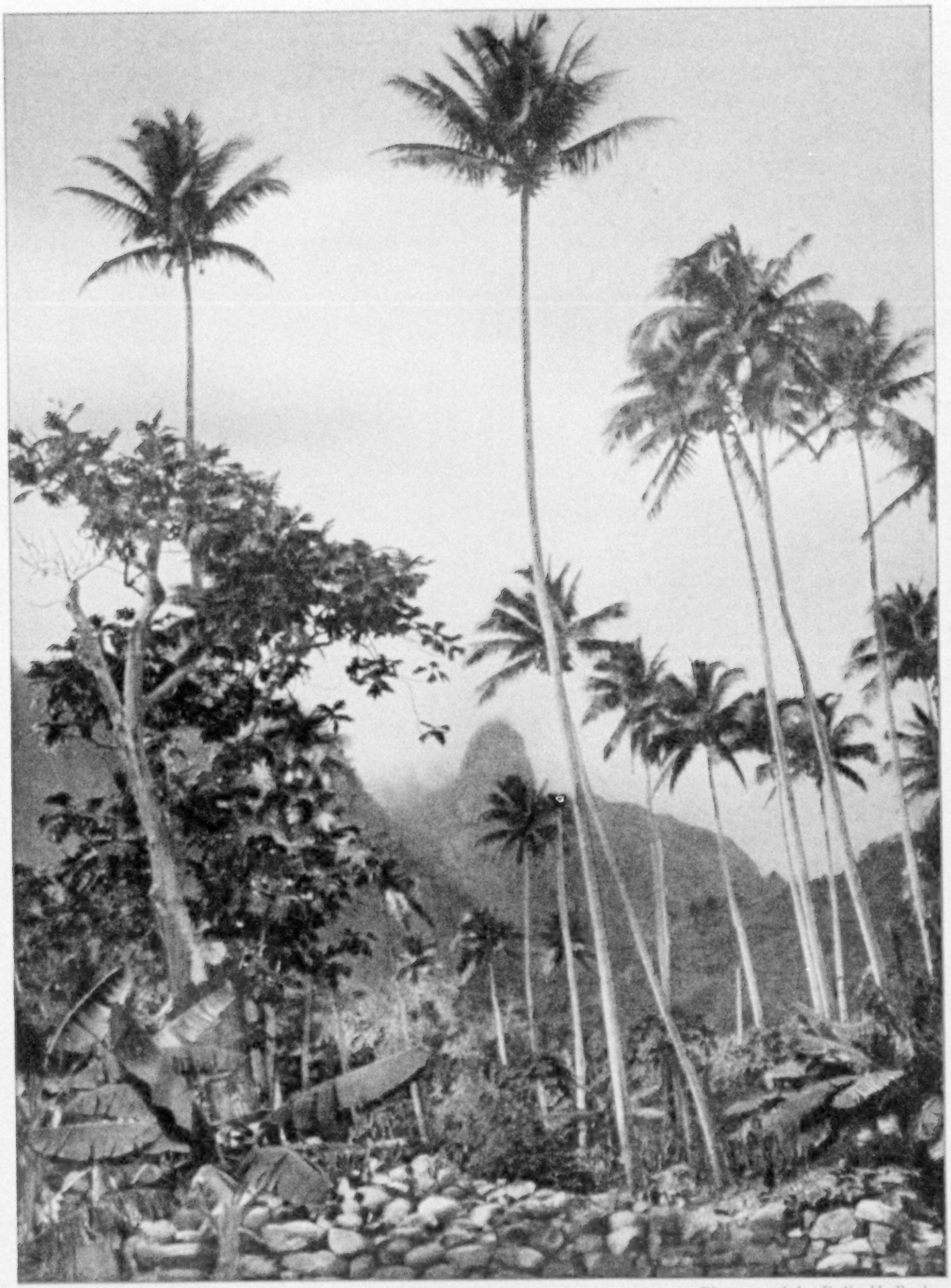
"The Dangerous Islands" of French Oceania are well named. The photograph shows the looming reefs and islets of Tenararo, one of the numberless atolls of the vast Tuamotu Archipelago, as first seen from the deck of the *France*.



© Photograph by Rollo H. Beck

WASH DAY AFTER A LONG VOYAGE

In a clear streamlet beneath the weathered, lava battlements of Omoa Valley in Fatuhiva Island, Marquesas Group, the Polynesian sailors of the schooner *France* wash their prosaic, workaday clothing of shipboard, reverting for the time to the picturesque attire of the red *pareu*, a strip of calico which in recent years has supplanted the *tapa* cloth made from beaten tree bark.



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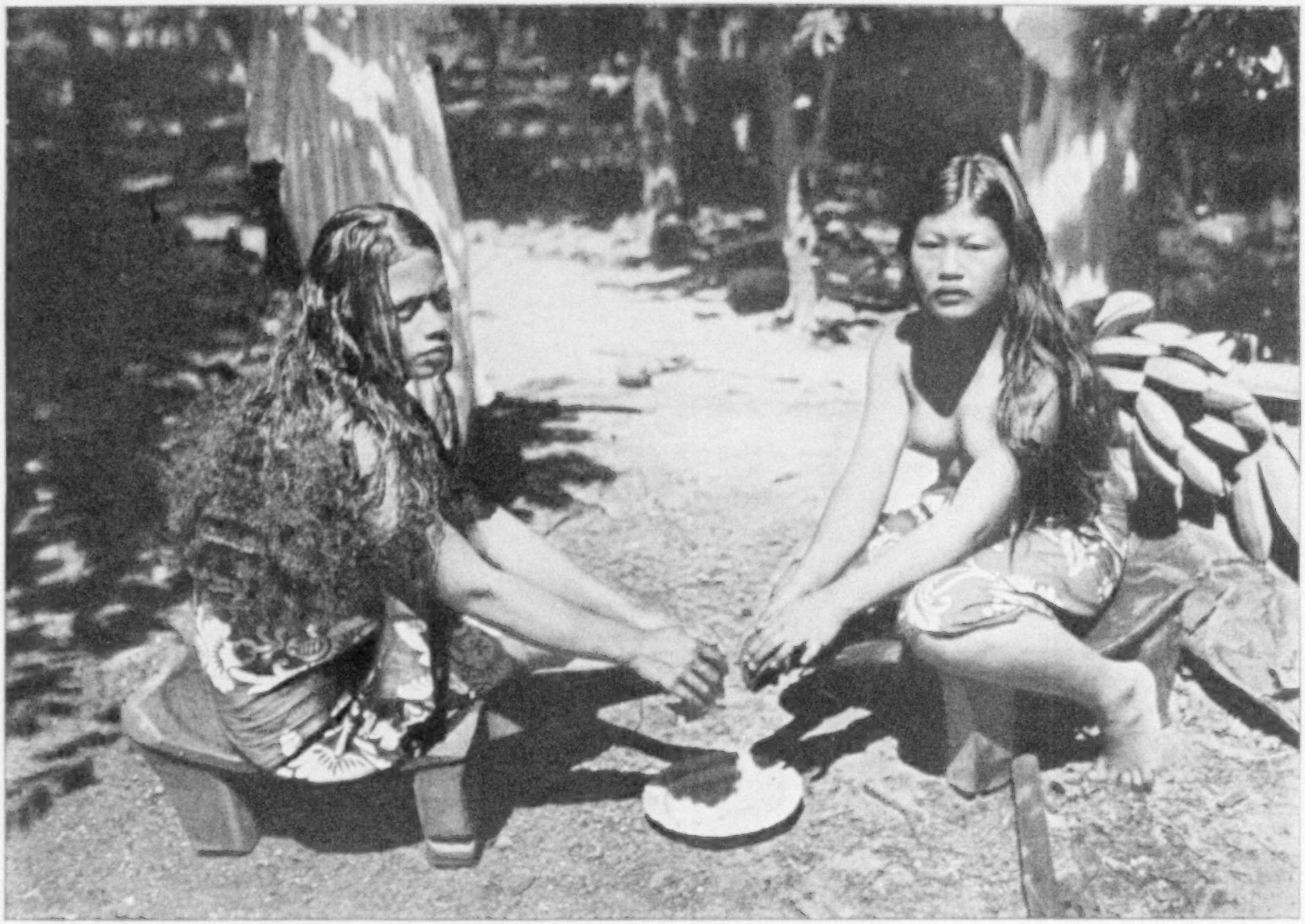
Photograph by Rollo H. Beck

THE "GIRAFFE OF VEGETABLES": HUAPU, MARQUESAS

So Stevenson calls the coconut palm. Speaking of the rock formations, he wrote, "—the needles of Ua-pu . . . pricked about the line of the horizon; like the pinnacles of some ornate and monstrous church, they stood there, in the sparkling brightness of the morning, the fit sign-board of a world of wonders."



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HOUSEHOLD LABOR IN RIMITARA

Natives of Rimitara, Austral Islands, grating coconut meat. The effective utensils are carved upon the "necks" of the heavy, quadrupedal stools. The native girl at the right shows pronounced mongoloid characteristics.

XUM

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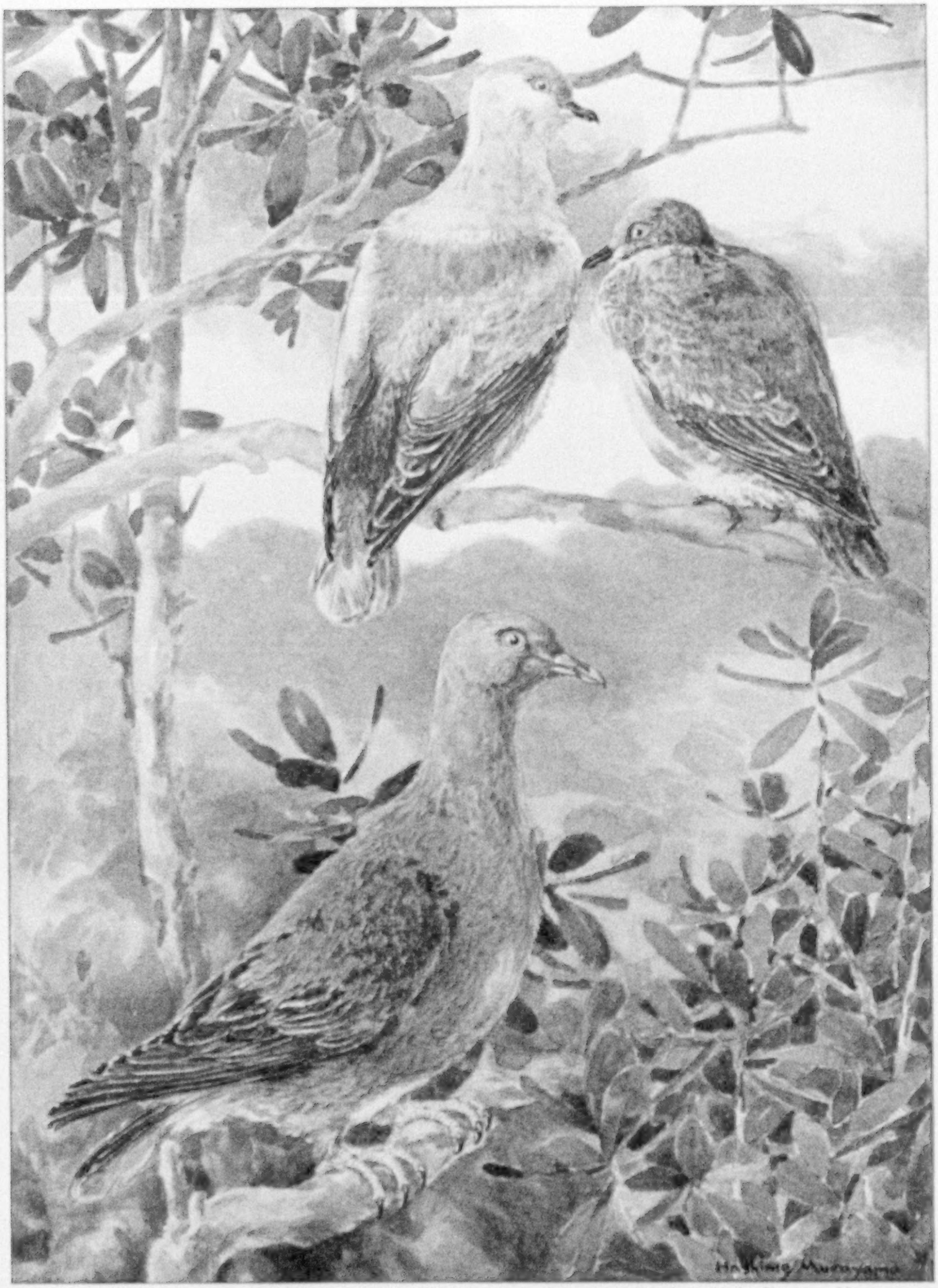
Photograph by Rollo H. Beck

THE CHIEF'S HOME IN RAPA

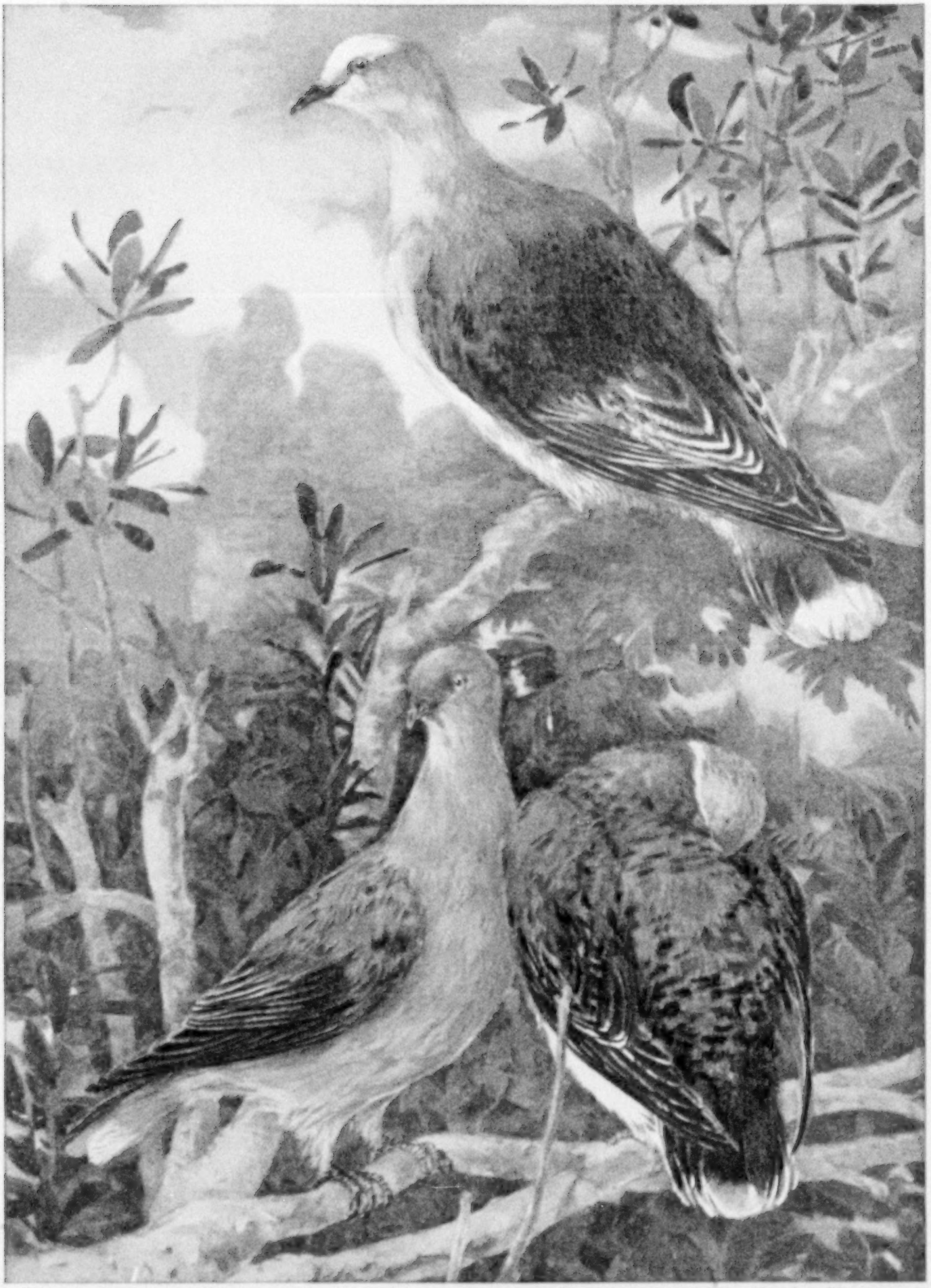
This pastoral dwelling was but one of several in which the members of the Expedition were feasted to the verge of collapse during their cruise among the Austral Islands.



© Painting by Hashime Murayama

FRUIT PIGEONS OF THE SOUTH SEAS

Above are a male (left) and female (right) of the exquisite species common to Samoa and Fiji, and called *Ptilopus perousei* in honor of the early French voyager, La Pérouse. Below is a large, raspberry-breasted fruit pigeon (*Thyliphaps huttoni*) peculiar to Rapa.



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BEAUTIFUL VARIETIES OF FRUIT PIGEONS

Above, the white-crowned, Marquesan fruit pigeon (*Ptilopus dupetithouarsi*); at the lower right a rose-crowned species (*Ptilopus tristrami*) found only upon Hivaoa Island, Marquesas Group; beside it is the purple-crowned Tahitian species (*Ptilopus purpuratus*).

© Painting by Hashime Murayama

LAND AND SEA BIRDS OF POLYNESIA

The upper bird is a widely distributed parasitic cuckoo (*Urodynamis taitiensis*); below it the little Marquesan kingfisher (*Halcyon godeffroyi*); and, at the right, the red-tailed tropic bird (*Phaëthon rubricaudus*).

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Painting by Hashime Murayama

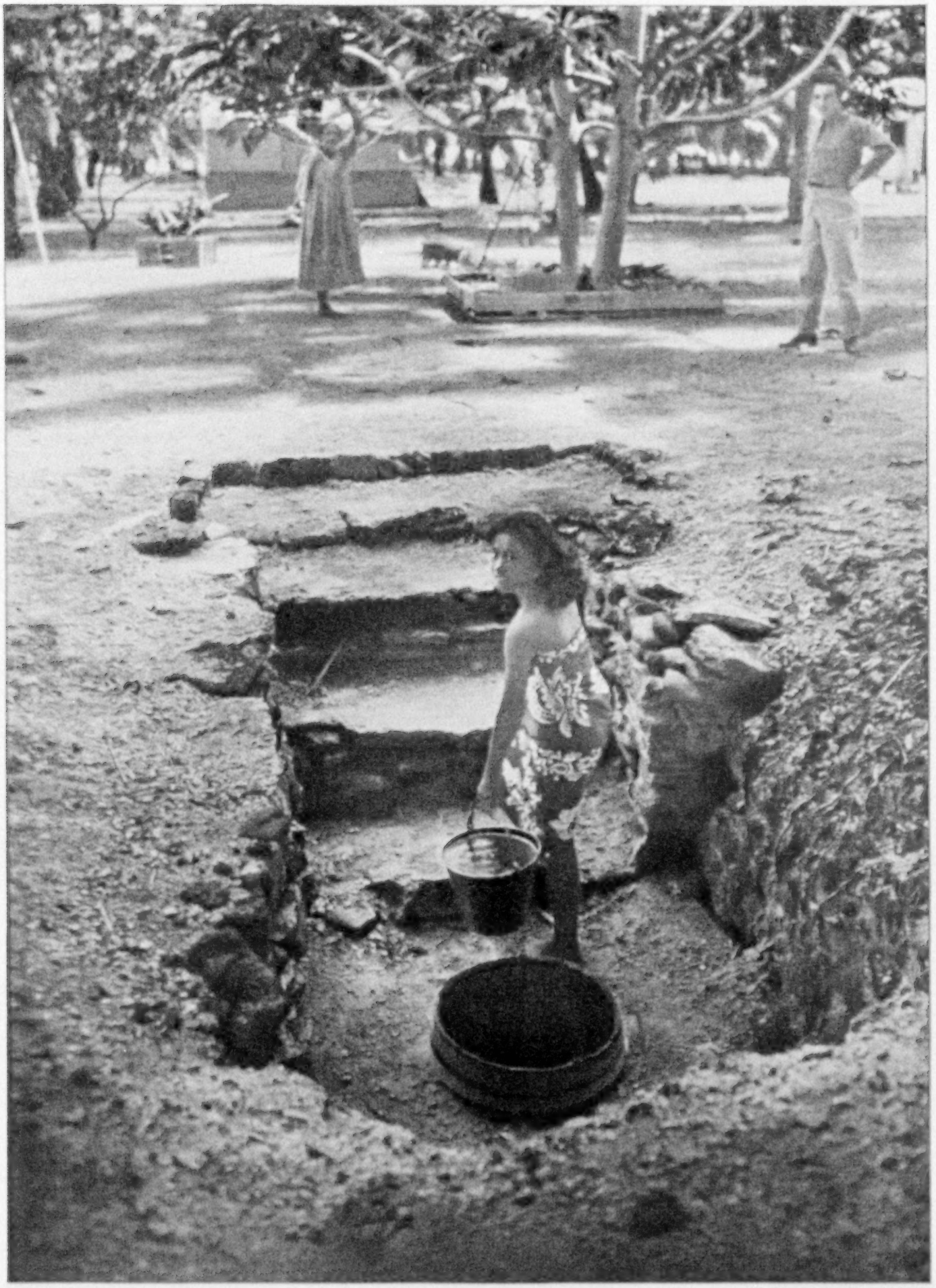
BRUSH-TONGUED PARAKEETS

Left, the species known as *Coriphilus peruvianus*, although it does not occur in Peru; center, the red-breasted parakeet (*Vini kuhli*) of the Austral Islands and elsewhere; right, the bizarre Marquesan species (*Coriphilus smaragdinus*). One or more of these have been distributed far and wide by the pet-loving Polynesian islanders.

© Photograph by Rollo H. Beck

A GARDEN OF EDEN, IN THE AUSTRALS

A scene on the hillside of Rimitara, with ripening bananas, elephant-eared taro leaves, and two citizens of a land where food is produced without sweat of the brow.



© Photograph by Rollo H. Beck

A WELL ON KAUKURA ISLAND

The fresh water of the Tuamotus comes from shallow surface diggings, and is derived from rain or through natural filtration from the ocean.

XUM

© Photograph by Rollo H. Beck

LADS OF RAPA

These boys, who served as guides, fail to understand the elation caused by the discovery of a Polynesian teal's nest.

when compared with records of a century or 50 years ago!

The Gambier cluster of the Tuamotus, for example, in which is included Mangareva, government seat of the eastern half of the colony, has now a population of 500. Formerly it was inhabited by 1,900 natives.

Crumbling stone houses line the shores of Mangareva. A convent, which in years past housed hundreds of girls, is to-day covered by the growths of the encroaching jungle and will soon be only a memory.

The cathedral of the island is larger than that in Papeete, and is decorated about the altar with thousands of pearl shells, telling of a congregation that is no more.

Anaa, in the western part of the archipelago, has but a handful of people, yet it was once the savage stronghold of the Tuamotus and was reputed to have a population of 5,000, as noted by Wilkes in 1839. In common with many others among the low islands of the Tuamotus, Anaa has suffered severely from hurricanes.

With reference to the dwindling and rapidly shifting population of the Tuamotus, under modern industrial conditions, Mr. Beck's journal mentions a motion-picture theater at the island of Takoumé, with nobody now living within five miles of the building!

RAPA WAS ONCE A FORTIFIED STRONGHOLD

Of the Austral or Tubuai Group, far south of the Societies, the most fascinating island is Rapa, which lies detached from the others, well beyond the Tropic of Capricorn.

Rapa was discovered by Vancouver in 1791. For the next 35 years the native savages had little contact with the outside world, but about 1825 they began to be Christianized through the first intercourse with Tahitian missions.

In later years Rapa became a favorite port of call for whaleships, because the men of the island were peerless boatmen, but with the decline of whaling, the curtain of isolation once more descended. Now Rapa is visited only two or three times a year.

Twice during the Whitney Expedition periods of a week or longer were spent at Rapa. On the first visit Mr. Beck tramped off across the taro fields and through the coffee groves toward one of the ancient and mysterious forts that top the ridge of the island (see illustration, page 420).

Climbing through ferns knee-deep, he soon reached the crest. Four distinct levels on the ridge had been protected by built-up rockwork, and at the highest point a massive wall had been constructed as a last stronghold. On a leveled terrace just below was a small rainwater cistern.

Four miles away in an air line, two other forts stood up against the sky. These were so built that a small force could defend itself against a host of besiegers as long as food and water held out. The only approach was by way of the ridge, for the adjacent sides of the mountain were too steep to scale.

Down to eastward the beautiful harbor of Ahurei, with scattered taro beds about its head, showed clearly (see Color Plate IV), while high above the village wild goats could be distinguished along the craggy ridge. South of the fort the hill rose to nearly 2,000 feet, forming a backbone of unclimbable cliffs, while toward the west and north other ridges divided narrow valleys and cut the island into sharply defined districts.

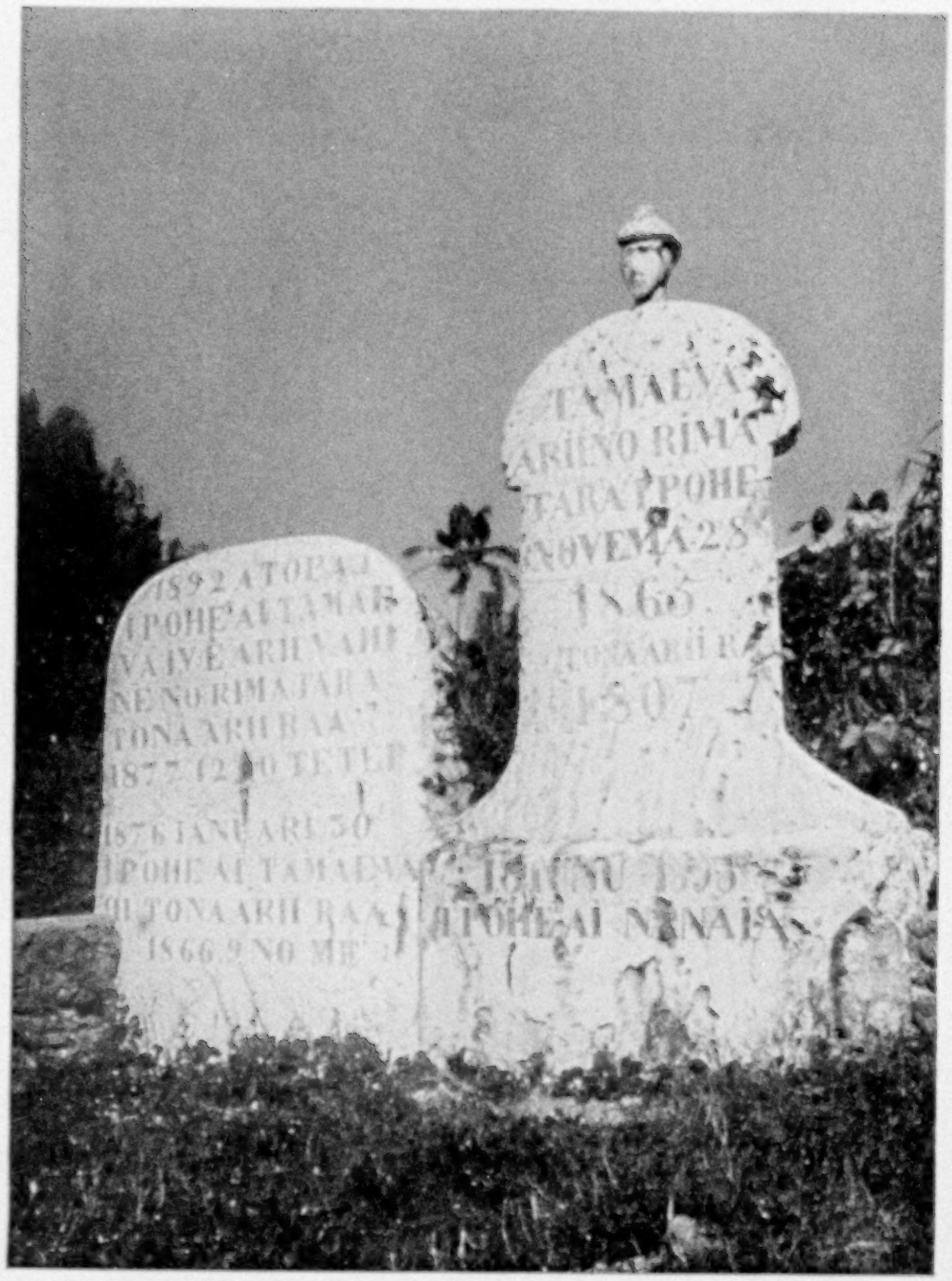
Upon returning to the shore, Mr. Beck found the captain and mate and their wives enjoying the charming garden of the French administrator, where fig and orange trees were weighted with fruit. A splendid crop of tobacco, maturing in a small grove, also bore witness to the rich soil and the favorable climate.

THE TRIALS OF DINNER GUESTS IN RAPA

While they were lingering in the garden, the native chief's son arrived to lead the visiting guests to a Sunday feast. On the way thither they were followed by a troop of the island children, some in shirts, some in *pareus,* one in the discarded vest of an itinerant visitor, and several of the youngest wearing nothing at all. As they entered what was at first supposed to be the residence of the chief's son, the supercargo, who knew the customs of Rapa, warned all the strangers to eat lightly, as they would be expected to partake of food at several additional homes.

POLYNESIAN FORTIFICATIONS ON THE CRESTS OF RAPA (SEE PAGE 419)

The full significance of these ancient structures is hardly less enigmatical than that of the great stone monuments of Rapanui, or Easter Island. (See "The Mystery of Easter Island," by Mrs. Scoresby Routledge, in the NATIONAL GEOGRAPHIC MAGAZINE for December, 1921.)



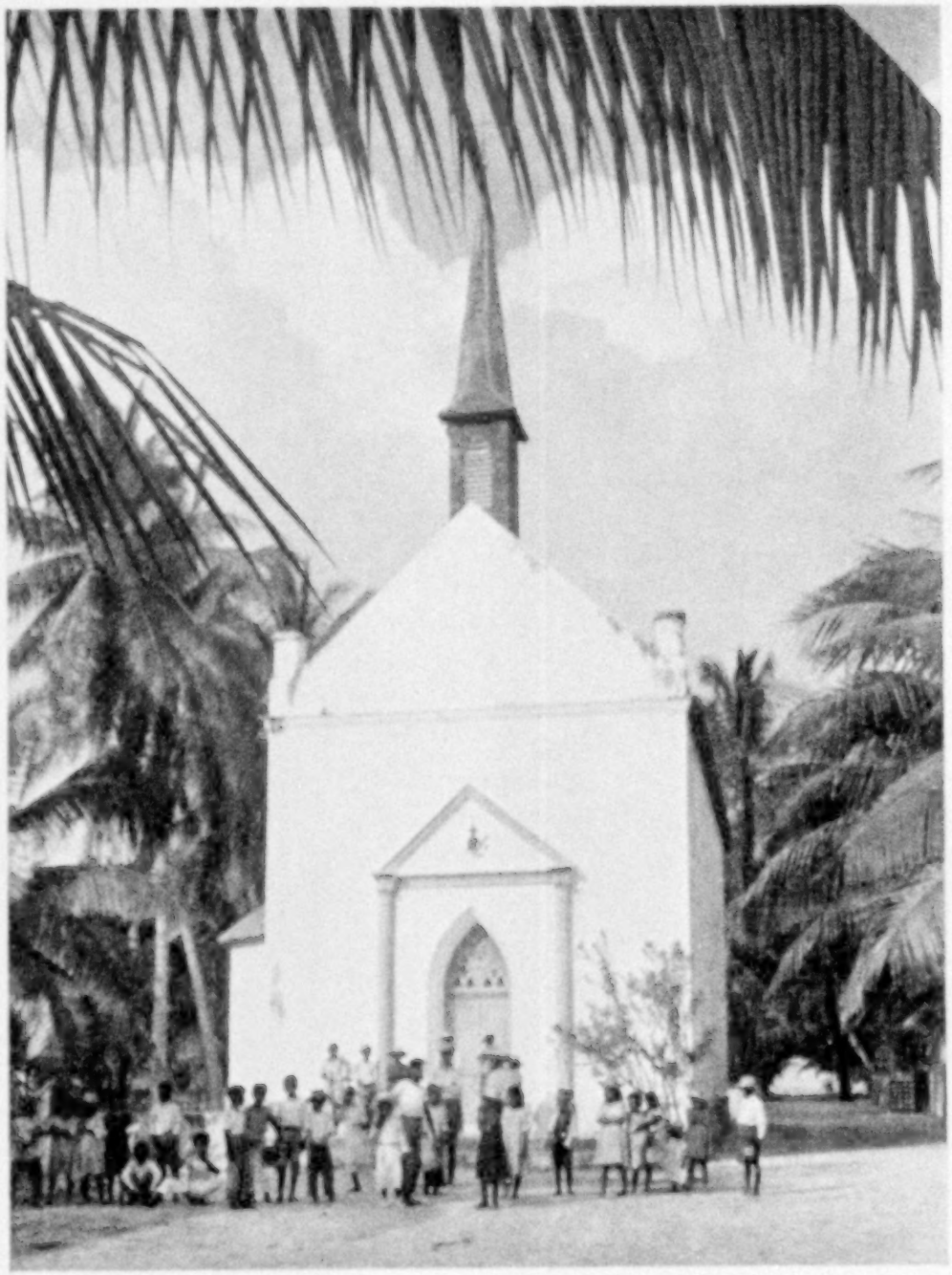
A KING'S TOMBSTONE ON RIMITARA ISLAND

A Christian memorial, but not without reminiscence of the old paganism.

AN OLD IDOL IN THE FOREST OF VAVITAO

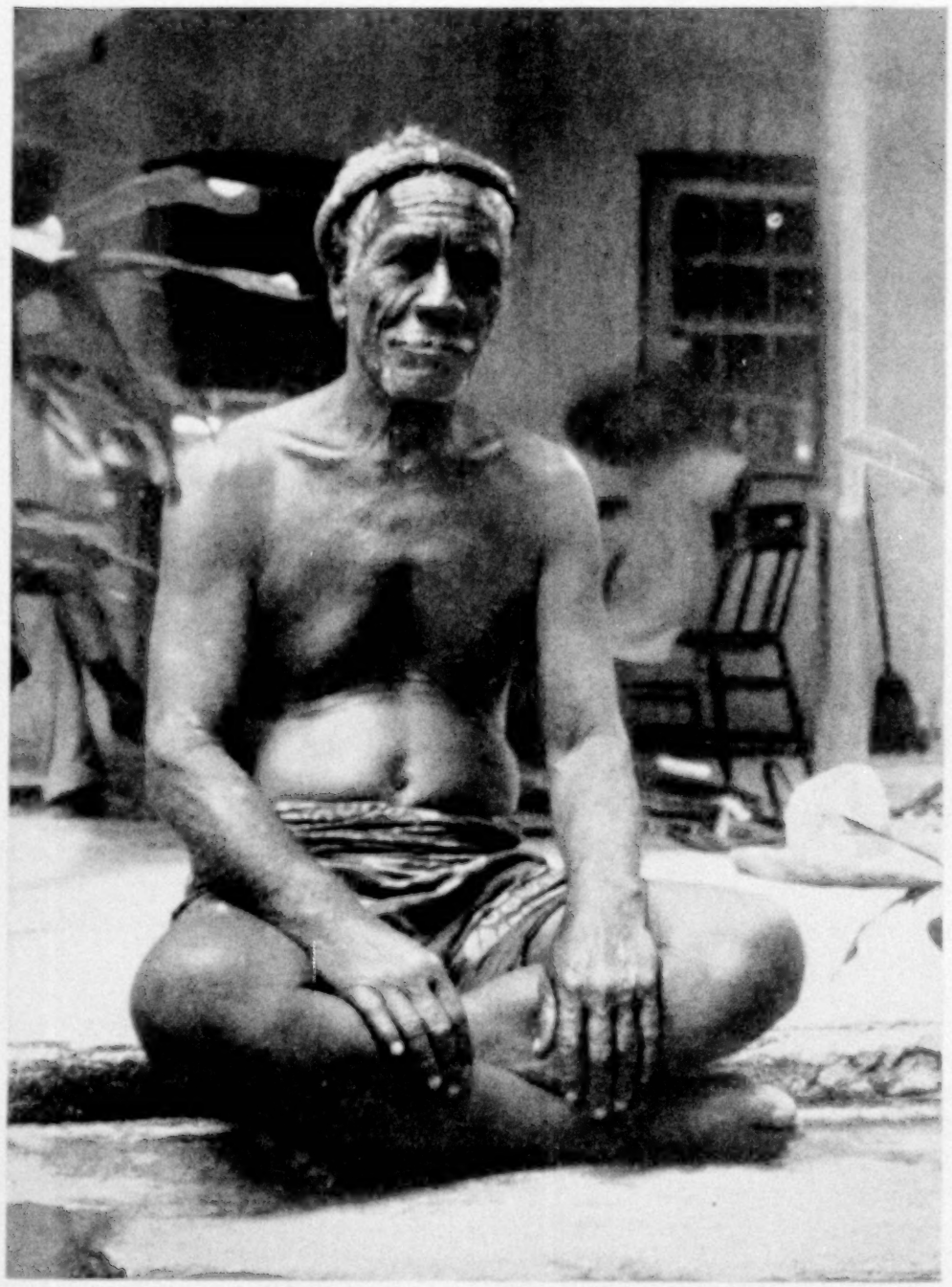
Many such stone carvings (*tikis*) were overthrown and destroyed after the Christianization of the natives.

A SCHOOL TEACHER AND HER SISTER ON THE OBSERVATION POST OF MANIHI ISLAND, TUAMOTU GROUP



THE ROMAN CATHOLIC CHURCH AT MAKEMO ISLAND, TUAMOTU GROUP

TAKING NATURAL HISTORY NOTES ON FAKARAVA ISLAND, TUAMOTUS



AN AGED INHABITANT OF TAENGA, ONE OF THE CORAL ISLETS OF THE TUAMOTUS

A PREHISTORIC WALL OF LICHEN-COVERED SLABS, RIMITARA ISLAND

Fresh banana leaves had been laid in a row across the mat-covered floor, and at each place was a plate containing one or two whole fish, another with several large pieces of juicy pork, and beside the plates a taro root. Seating themselves on the mats, the diners ate with their fingers.

When the first few pieces of fish gave way to the pork, the serving maids brought in the *poipoi*, the Polynesian staff of life resembling sticky, yeasty dough, neatly wrapped in the broad green leaves of the *rauti* plant.

While they were still eating, the son of the chief appeared again and advised them to hurry, as dinner was awaiting them at *his* home. So, leaving the untasted residue of the first banquet, they walked to the scene of a similar repast. In addition to fish, however, they here found a whole lobster at each place, and *two* taro roots instead of only one.

Before this meal had proceeded far, the captain leaned back from his partly eaten lobster, which was close to two feet long, and in deference to his example the other guests first slackened their pace and then ceased.

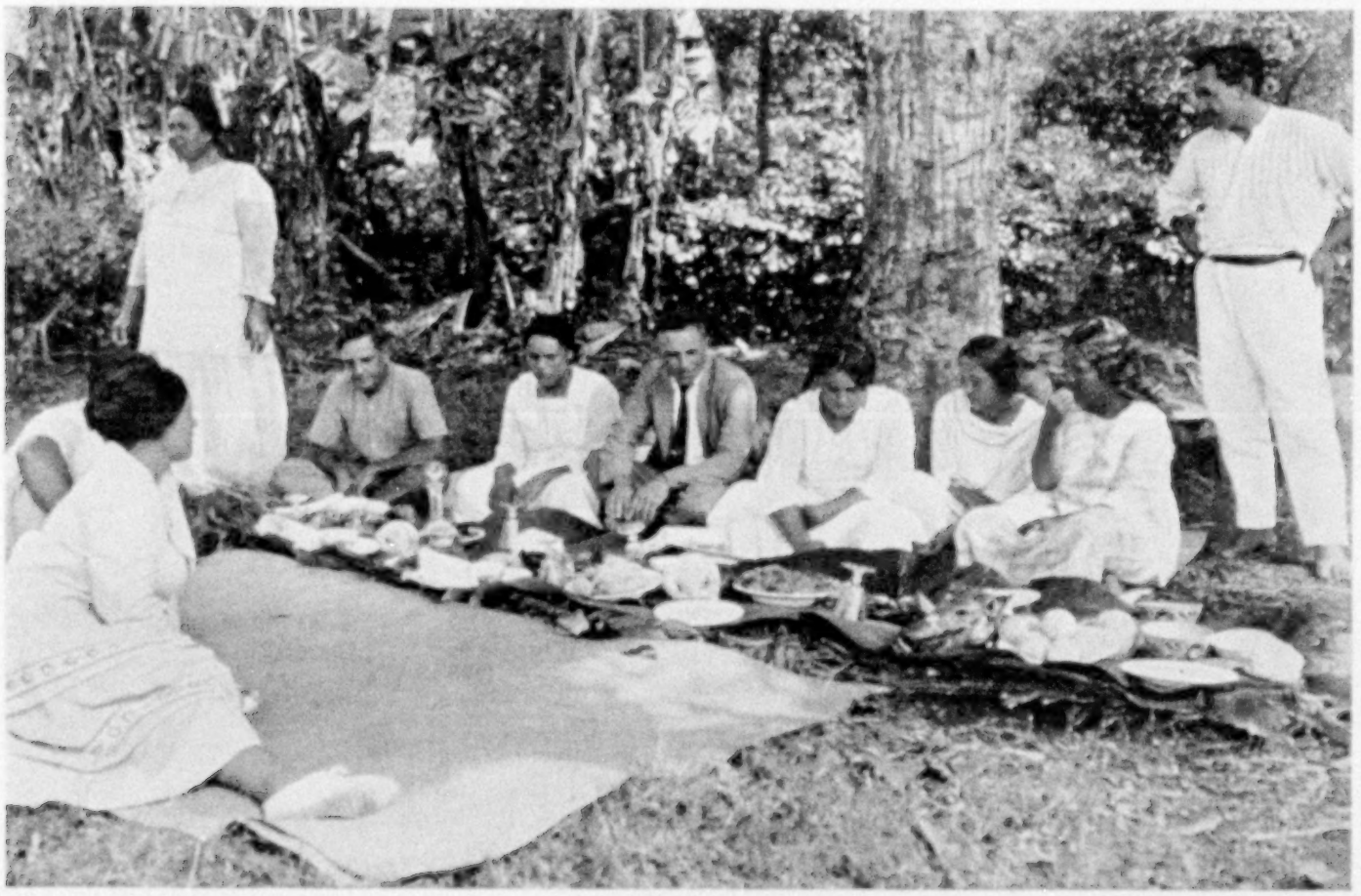
They next passed along a lane to a thatched cottage smaller than the others, and encountered a repetition of what had gone before, except that deliciously cooked chickens replaced the pork.

The supercargo again reminded them to eat sparingly, as a hearty appetite should be reserved for the chief's home, to be visited next!

When the party finally strolled over to the large dwelling of the chief, his wife and three or four girls welcomed them in the open yard before the door (see Color Plate IX).

In this house, lobster, pork, and chicken were in readiness as a last test of gustatory capacity. The taro had been increased to three big roots, although a small bit from the end of one root would easily have sufficed for a meal.

Besides the staples, the chief had supplied coconut milk in which to dip the meat and roots, a rare beverage in Rapa, as coconuts can be obtained only from ships coming from more northerly islands. They were served also with molasses made from the roots of the rauti. The syrup was placed on the plate with the



HARDSHIPS OF AN EXPLORER'S LIFE

The leader of the Whitney Expedition and the engineer of the *France* are about to regale themselves with boar's head, fish, chicken, breadfruit, poipoi, fruits, and other staples of Mangareva (see, also, account of the feasts on the island of Rapa, pages 419-424).

poipoi, enabling the latter to go down more easily than when it was lubricated with water only.

At the conclusion of what, fortunately, proved to be the last meal, bananas were passed around.

FAREWELL GIFTS BESTOWED BY A HOSPITABLE PEOPLE

On another day, a few of the hardy, energetic native fishermen made a trip to the lobster beds at the entrance of Ahurei Bay, and brought back 100 lobsters for the visitors. Practically every house in the village entertained one or more of the schooner's crew during the entire stay.

At the captain's suggestion a case of kerosene was presented to the church, the light of which shows up brightly as vessels enter the harbor.

That this courtesy was appreciated by the inhabitants was shown by their gifts on the day of leavetaking. A count of the acquisitions on deck, after the departure of the pilot, showed 5 sacks of taro, 18 packages of poipoi wrapped in rauti leaves, 19 boxes of taro and poipoi, 15 bunches of bananas, 22 rabbits, and 14 goats. Very few of these items had been purchased; the greater number were presents from the most hospitable people in the Pacific.

The girls and younger women at Rapa do most of the labor in the taro fields, while the older women attend to the housekeeping (see illustrations, pages 370, 381, and 382). The exemption of the men from agricultural labor allows them more time for fishing, and as a result of their sea experience they are much sought by captains of sailing vessels at Papeete.

The constant demand for Rapa men during a period of nearly a century has led to a considerable preponderance of women in the island population.

RAPA NATIVES ARE PEERLESS BOATMEN

Upon the second visit of the expedition, when the *France* was three or four miles from shore, a boat came out to meet the schooner. The men had made no allowance for the fact that an engine was aiding the sails, and within a minute they

TWO MEMBERS OF THE EXPEDITION DISCOVER A BOOBY'S NEST ON FAKARAVA ISLAND

were left 100 yards astern. But when the cabin boy, a native of Rapa, called out to them to catch up and be towed, they bent their oars and showed what they could do.

The schooner was progressing at a rate of about six miles an hour, but the boat was going at twice that speed when it neared and overtook her.

On another occasion a Rapa crew rowed five miles to an islet on which certain sea birds were nesting. Two of the members of the crew were only about 13 years of age, but when a heavy storm arose these lads stood the test of pulling for hours against a head wind and a rising sea, even though the poorly balanced, homemade oars weighed close to 50 pounds.

GIRLS OF RAPA ARE EXPERT IN HANDLING OUTRIGGER CANOES

The girls of Rapa are scarcely less skillful in using their unstable-looking outrigger canoes. At evening they would frequently pass the schooner on their way home from taro fields on the far side of the bay, with heavy loads of the roots weighing down their narrow dugouts almost to the swamping point (see illustration, page 381).

From babyhood these people become familiar with the sea. At all hours the children can be seen playing in the water or paddling tiny canoes alongshore.

The whole population of Rapa, exclusive of a few lepers confined in another valley, was living in or near the village on Ahurei Bay at the time of the Whitney Expedition visits.

Five or six valleys that formerly supported villages (and which may have warred with one another in their oceanic microcosm from immemorial time) are now deserted.

Only the lofty, stone forts, last refuge of the inhabitants of these communities (see page 420), still stand as monuments on the hilltops, and can be discerned from far at sea.

COLLARIN' CAPE COD

Experiences on Board a U. S. Navy Destroyer in a Wild Winter Storm

By Lieutenant H. R. Thurber, U. S. Navy

ON BOTH sides of the long dock at the Yard flurries of action told that the other ships of Squadron Nine were getting ready to shove out into the stream. Whistles and sirens were being tested, safety valves blowing off, the exhaust steam scurrying away down the wind, men running about decks, signalmen tailing pennants of signal orders to the yardarm and whipping them out into the fresh breeze. It was crisp weather, such as kept all hands moving to prevent stiff fingers and toes.

"Is everything ready, Page?" Captain Welles was looking along the dock.

"All ready for getting under way, sir," replied the Executive Officer, saluting smartly.

"Well, let me see." The Captain was musing aloud, a twinkle in his eye. Only a two-and-a-half striper (lieutenant commander), Captain Welles, nevertheless, was known throughout the entire fleet as a destroyer handler *par excellence*. "Sort of looks as if we might hang up on that lighter if the tide catches us; or, if the wind hits our bow, we might be in a bad way on the piling at the end of the dock. What do you think, Page?"

"I think if we backed our port engine one-third, sir, with right rudder, we would clear nicely and easily," said the "Exec."

"Well, I don't know. Suppose you take her out."

From my position, discreetly removed from the front of the bridge, I turned to the Chief Quartermaster.

"Say, Stearn, what's the idea?" I nodded toward the Captain and Page.

Stearn, red-haired and bright of eye, taking cognizance of my ensign's single stripe, explained.

"Well, you see, Mr. Hall, the Captain believes in letting his officers handle her, especially the Exec. These here destroyers have pretty near as much horsepower as battleships, and they can move fast. And you never know which way they're wantin' to go."

SAYING FAREWELL TO SNOW-COVERED BOSTON

Sharply at two the K * * * 's whistle tooted, the icy lines were hauled aboard, and we slid gracefully out into the stream. Heeling down river, we whipped up our wake and proceeded toward President Roads. The bite of the cold wind caused those not needed above decks to hunt the heated living compartments as soon as the lines were reeled and loose gear was stowed and lashed. It was my portion, as "makee learn," to stay on the bridge.

After observing the ease with which Page got the ship under way from the dock, I sought the lee wing of the bridge, watching with keen interest the water front and shipping.

Stearn joined me.

"Look there, Mr. Hall." He pointed back toward the Navy Yard, where two flags were being hoisted—a red flag with a black center over a red pennant. "Southeast storm warning, Mr. Hall," he remarked with something akin to a malicious smile.

A few hundred yards ahead of us the squadron flagship, the S * * *, was showing her heels to the ships astern. Close on our port quarter the foremast of the L * * *, towering upward some hundred feet, came to view, and then her bridge and four stacks were visible; soon she went racing past to assume her position in column, the roar of her forced draft blowers sounding like that of an express train.

Over there, at one of the many docks which lined the water front, a tug was puffing out, pushing an unwieldy barkentine with snow-whitened rigging. An inbound coastal steamer was screeching for the right of way over a lumpish trawler

Photograph from Hamilton Maxwell

THE CHARLESTOWN NAVY YARD, BOSTON, MASSACHUSETTS

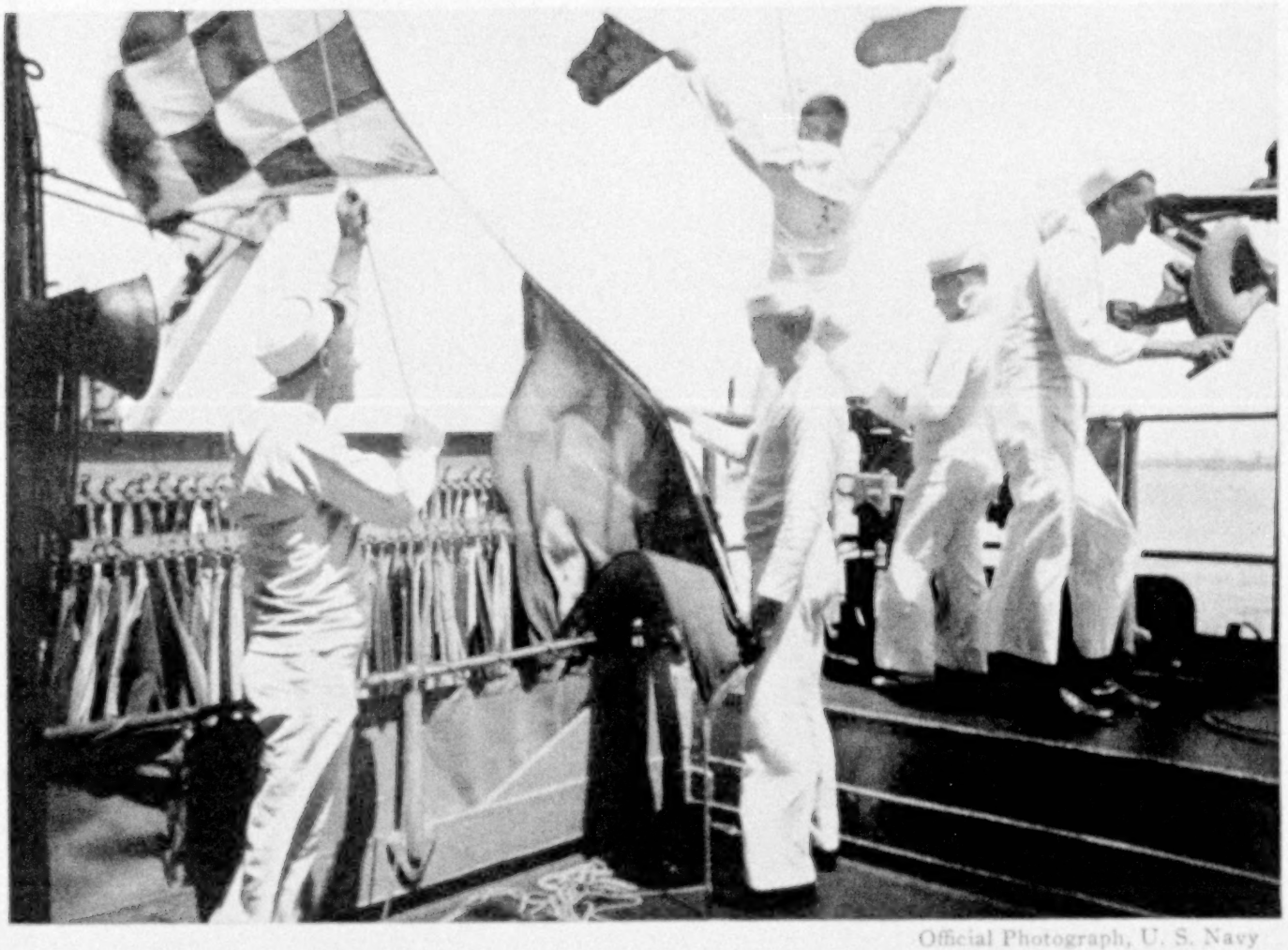
In addition to being an important Naval station and possessing one of the world's largest dry docks, this Navy Yard is also the home port of the *Constitution*, the famous "Old Ironsides." This fine old ship, made immortal by her many victories, especially that over the English ship *Guerrière*, in 1812, was a 44-ton frigate. She was saved from scrapping in 1830 by Oliver Wendell Holmes' thrilling poem, "Old Ironsides," and since 1877 has been used some as a training vessel. She may be seen in the left foreground, with three destroyers moored in the same slip to the right and the great dry dock a little to the left and beyond.

XUM

Official Photograph, U. S. Navy

LIKE AN ARROW IN FLIGHT

The larger destroyers have a displacement of more than 1,200 tons, are about 300 feet long, and have a 36-foot beam. They are oil-burners and can attain a speed in excess of 30 knots. Their armament usually consists of four or five four-inch guns, two or more sets of torpedo tubes, two mounted machine guns, and a store of depth bombs.



Official Photograph, U. S. Navy

ACTION ON THE SIGNAL BRIDGE (SEE, ALSO, PAGE 467)

The man at the extreme right is receiving a semaphore message through the telescope, while the one standing on the rail in the center is sending the same kind of message, his arms forming the letter "U." The two men at the left are hoisting signal flags just taken from the flag locker in front of them.

hugging the wrong side of the channel, close to an ice-topped can buoy.

Down toward President Roads, where the North and South channels forked out to seaward, was anchored a fleet of barges, low in the water, waiting settled weather and a tow through Cape Cod Canal.

The prolonged snowfall, lasting through the Christmas holidays, had whitened the muddy banks of the channel, covered the roofs and docks of warehouses along the river front, and mantled the surrounding hills with a heavy winter coat. Overhead the sky was leaden and the wind was tumbling cumbrous clouds hurriedly out of the southeast.

On the bridge we were muffled to the ears now; for, as the ship had picked up her speed, the raw air had nipped our faces to a bluish hue. The Captain, enveloped in heavy uniform overcoat, his hands stuffed into side pockets, paced the bridge briskly, glancing now and then at the chart, by which he was conning the K * * * down harbor.

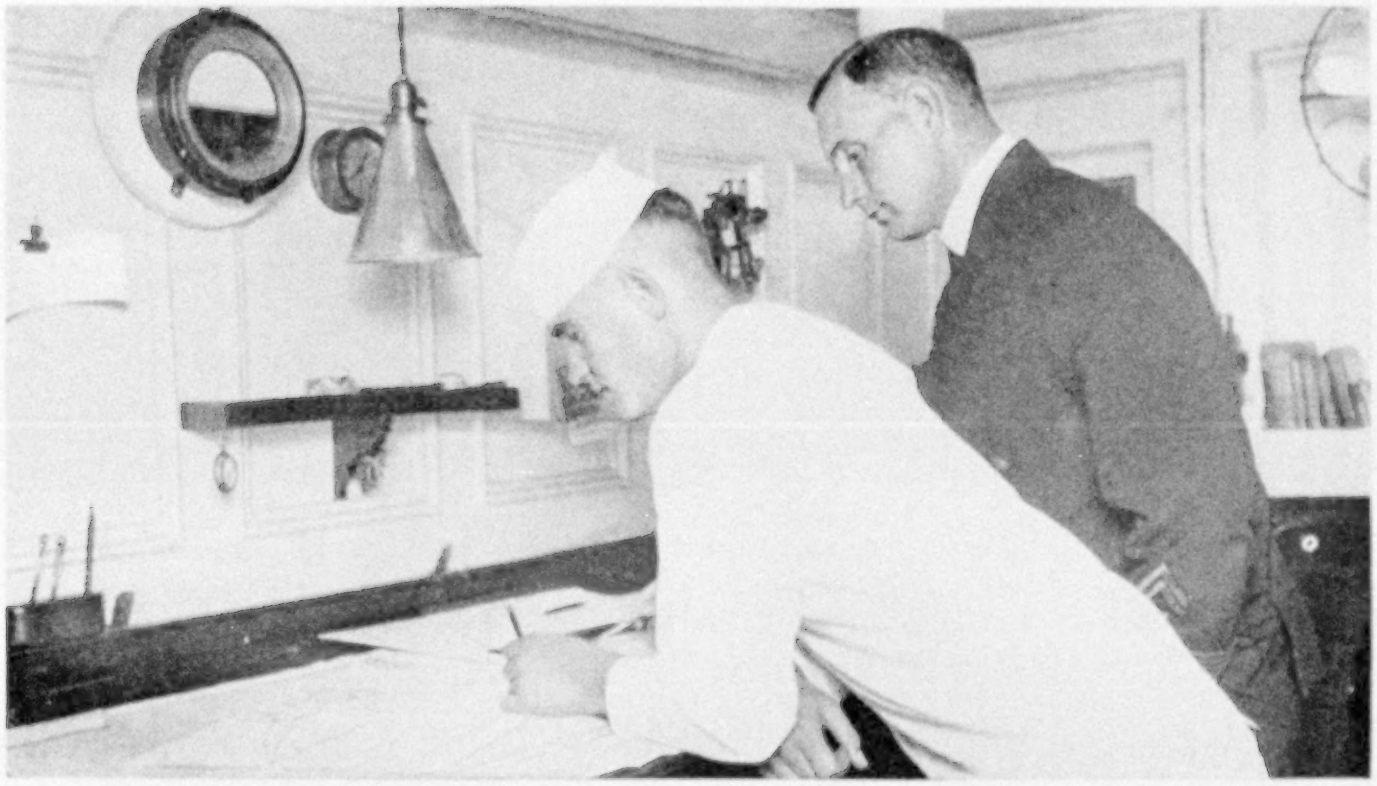
We were in position in column by this time, three ships between us and the flagship. The Exec. kept us smartly at our proper 300 yards' distance astern of the L * * *. Trailing us, well closed up, were our eleven other squadron mates.

In a short time we were sliding past buoys close-anchored in the strong current of the North Channel. As the course was changed eastward and the white tower of The Graves appeared, we began to pitch lazily. Wind and sea from the Bay were backing an ebb tide, and out farther the gray-green expanse of open water was spread with whitecaps.

THE STARBOARD TURBINE BREAKS DOWN

"Huh!" I mused. "Looks as if my initiation is about to begin."

My "initiation," however, was due to



Official Photograph, U. S. Navy

CHARTING THE COURSE

This young sailor is being initiated into some of the mysteries of navigation by the officer at his side.

be delayed, for the Senior Engineer Officer, chagrin in his eyes, dashed up the bridge ladder.

"Captain," he announced, "starboard turbine bearings are all running hot. I'd like to look at them before we go outside. We can run on the port engine until we're ready to lift the starboard bearing caps, and then we'll have to stop and examine them."

Captain Welles strode to the engine-room annunciators. "Hoist the breakdown flag," he ordered curtly. "Sheer out to the right, Page."

As the ship swung out of column, he rang up "Stop!" on the starboard engine annunciator.

"All right, Johnston," he shot out. "Fix 'em. Let me know when you're ready to stop everything." He wagged his head and snorted. "Knew those bearings needed overhaul by the Yard. Signal the Squadron Commander, Page. Request permission to stop and examine hot bearings."

A waiting signalman jumped up to the flying bridge with a pair of semaphore flags; another hoisted the call pennant for the squadron flagship. The S * * * answered, and the semaphore flags began to snap their message (see page 430).

It was a matter of half an hour before Johnston reported he was ready to look at the bearings. The port engine was stopped, and examination revealed that further steaming was impossible until repairs were effected. After getting permission from the Captain, Page ordered "Let go!" and the port anchor splashed over the side. It was then 3:30 o'clock. Boston Light Vessel was visible southeast about five miles.

"Hall can stand the deck watch at anchor, don't you think, Captain?" Page asked.

"Yes, certainly. You've had some deck-watch duty on battleships before, I believe, Hall? Johnston, how long before you'll be ready to get under way? Eight o'clock! I'll have to notify the Squadron Commander. Guess this means we'll go on to Norfolk alone. Don't like it, either." He stamped down the bridge ladder.

I could well understand the Captain's annoyance. The ship had not been overhauled to suit him because of a shortage of money for the work. Then, too, the crew contained but a skeleton of seasoned men. There were many new men, a majority of whom were recruits fresh from

Official Photograph, U. S. Navy

"SAIL, HO!"

During the World War a lookout descending from the crow's nest caused a convoy of ships some anxious moments when his foot slipped. In the hurried descent that followed, he fell across the whistle cord and a prolonged toot resulted. Thus momentarily held up in his fall, he grasped for something to hold to and chanced to seize the halyard that released the green flag from the yardarm. It so happened that a long blast of the whistle and running out a green flag were the signals of a submarine attack, and, while there were no U-boats in the vicinity, the sailor's carelessness caused an alarm to be sounded.

a training station, and had been received on board at the eleventh hour. This greenness of personnel extended even to the officers, for Atkins and I were but ten days on board, and in the particular case of officers we were short-handed as well.

THE SEA BEGINS TO "KICK UP"

Left as Officer-of-the-Deck, I busied myself looking over the charts laid out for the voyage to Norfolk, glancing occasionally around the horizon. The sea had commenced to "kick up" a little and the K * * * rose and fell gently, straining lightly at her anchor. The wind was growing stronger, bringing a fine sifting of snow, which in the course of half an hour grew into a thick, white veil. By four bells a driving snowstorm had set in around us, walling in the ship as if she were incased in a shroud.

I sent for oilskins and rubber boots, and, shielding my eyes from the pelting flakes, began pacing the bridge, directing the quartermaster on watch to sound the ship's bell rapidly at regular intervals.

Only once during the watch did I stop pacing. This was when the C * * *, the last of the squadron to complete re-

Official Photograph, U. S. Navy

A BUSY WATCH ON THE BRIDGE

The man on the left is at the wheel, steering the vessel by the compass in the open case at his side. The instrument in the foreground is the engine telegraph (see, also, illustration on page 441).

pairs at the Yard, roared past, looming large as she ranged alongside, and then vanishing almost immediately into the curtain of white.

"Hot dog!" I exclaimed to the quartermaster. "I could have tossed a spud on her bridge!"

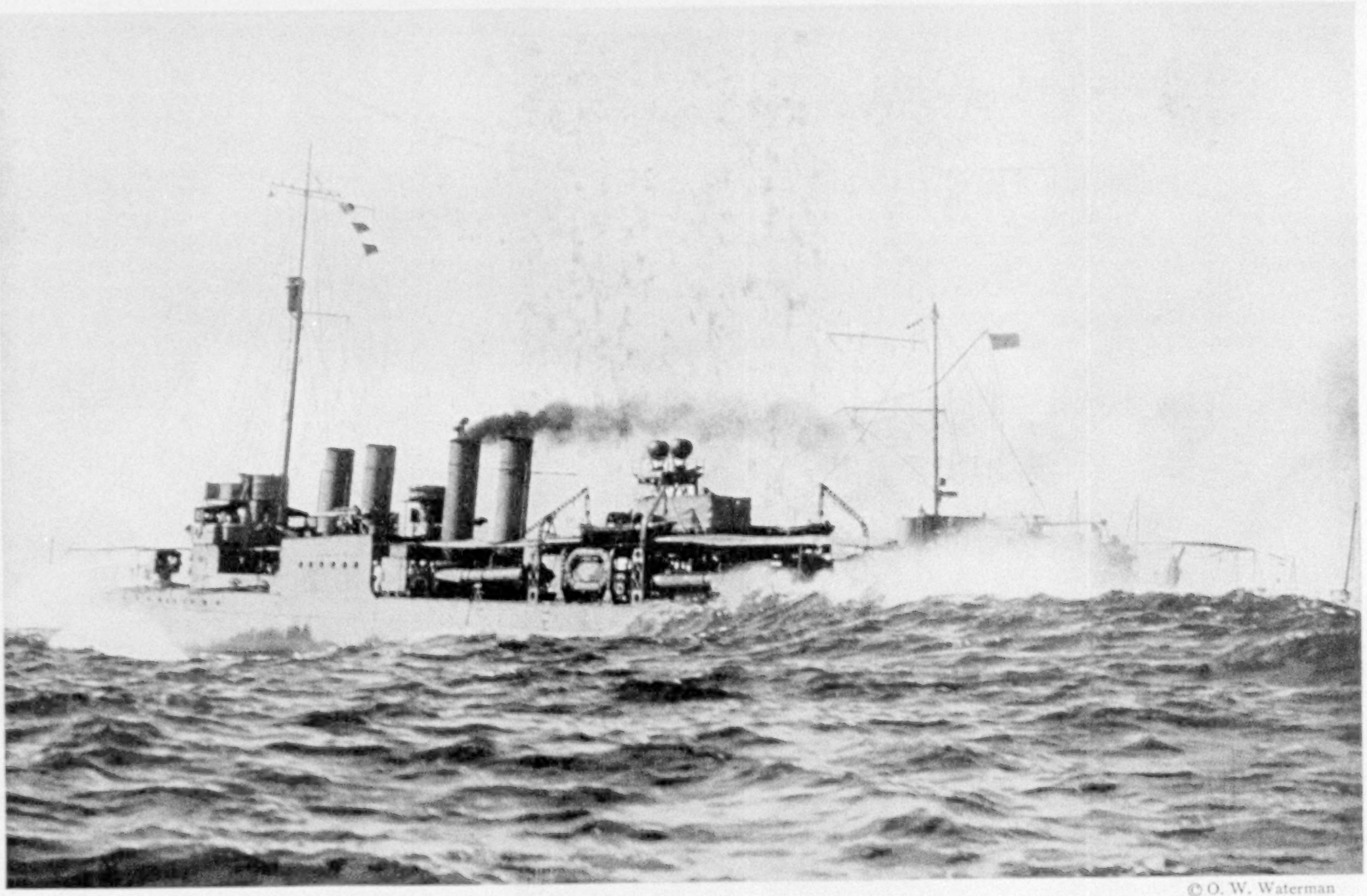
UNDER WAY ALONE FOR THE RENDEZVOUS AT NORFOLK

It was not until 8:15 that repairs were completed. Atkins, swathed in oilskins, had relieved me at eight bells, bringing news that the skipper had received a radio from the Squadron Commander to prepare for heavy weather.

At 8:30 the K * * *'s anchor was weighed and we were under way, headed southeast toward Boston Light Vessel. The red and green running lights and the white masthead light peered dimly at us on the bridge through streamers of snow outlined against the darkness, as we sped on our way, lurching and tossing occasionally in the rising sea.

I had remained on the bridge after being relieved and was standing at the Exec.'s elbow.

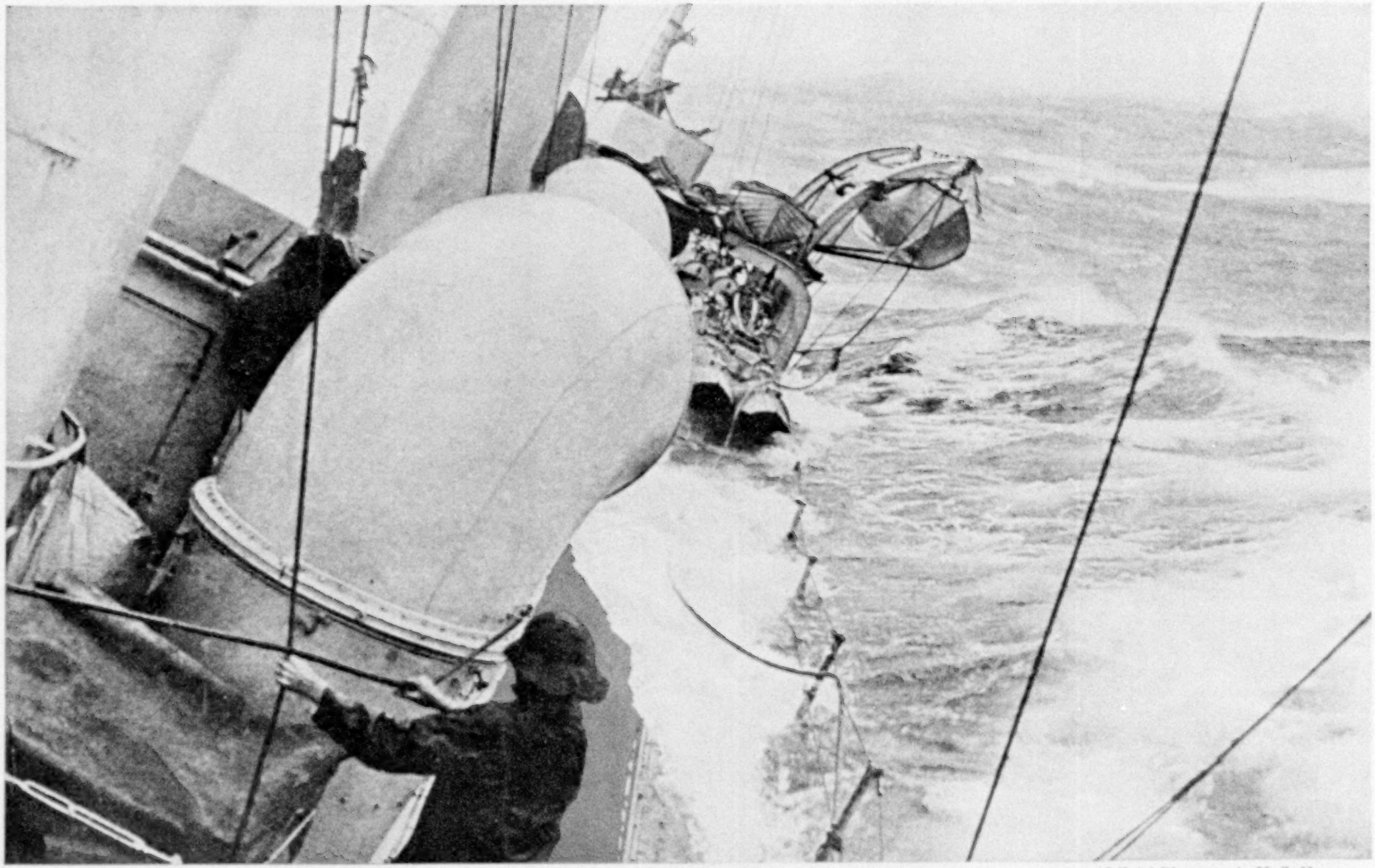
"Kind of thick to-night, isn't it, Mr. Page?" Page, his eyelids fringed with white, continued his search dead ahead, as he replied.



© O. W. Waterman

HEADING TOWARD NORFOLK, WITH CAPE COD "COLLARED"

With its long, rakish lines and narrow beam, the destroyer is the speediest and most mobile unit of the fleet. Although lying so low in the water that the waves often wash over its decks, it is an exceedingly seaworthy vessel.



Official Photograph, U. S. Navy

"SCUPPERS UNDER"

A destroyer in a rough sea is far from being a comfortable place in which to live. In the words of one who has been there, "The craft rolls dips, shudders, plunges like a horse straight up at the stars, sinks rapidly and horribly, and even has spells of seesawing violently from side to side. Its worst motion is an unearthly twist—a swift, appalling rise at a breath-taking angle, a toss across space to the other side of a wave, a fearful descent sideways and down, and a ghastly shudder."

Official Photograph, U. S. Navy

"HEAVING THE LEAD"

The leadsman, standing in the chains, uses the lead for taking soundings of the depth and nature of the sea bottom. The weight is hollowed out on the bottom, and this cavity is treated with tallow, which picks up some of the sand and shells from the floor of the ocean. By comparing the information thus obtained with his chart, the navigator is able materially to supplement the findings of sextant and compass (see text, page 448).

"Yep. Got to see this light, though, so we can shape a course to Cape Cod or Peaked Hill Bar gas buoy. Unless we get a good departure from Boston Light Vessel, we'll be wandering around pretty much in the dark off Cape Cod, and there are enough wrecks piled up on the cape now."

Twenty minutes passed. On Page's suggestion, the Captain slowed speed.

"Don't want to run afoul of the lightship," muttered the Exec. "Couldn't see her much before we hit her. Ah!" It was a sigh of relief, for there, close aboard, on the starboard bow, was the blinking white light, dimmed in its range almost to uselessness by the driving snow.

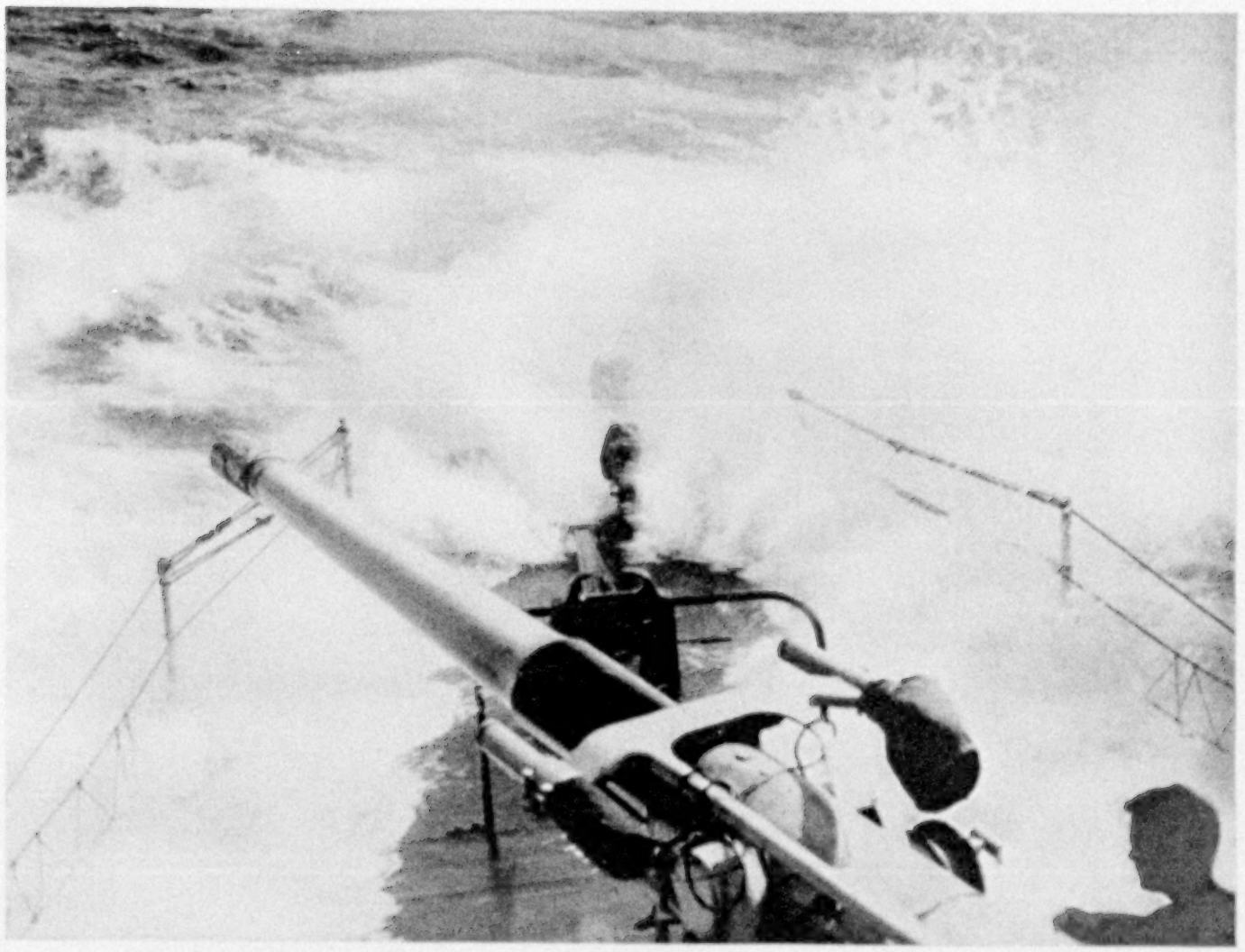
I watched the Exec. as he laid the course on the chart for Peaked Hill Bar gas and whistling buoy. Page, singing out the new course to Atkins, turned, nearly walking over my feet.

"Say, son," he exclaimed, surprised at my presence, "you'd better go down and turn in. You'll need all the sleep you can get before 4 o'clock. I'll have you called about a quarter of."

I accepted the advice with alacrity, for, to tell the truth, I didn't care at all for the motions the ship was going through as she came on her new course.

I started down the bridge ladder, my knees unsteady, and had reached the bottom tread when the K * * *, lifted high by a long, green wave, dropped into the trough following it and left me hanging by my hands alone to the ladder rail.

Then the bow was tossed up, my feet hit the steel deck, and the jar shocked me to the topmost hairs. But the bow nosed under the next comber, and, as the ship labored to lift and free her forecastle of



Official Photograph, U. S. Navy

THE "FANTAIL" OF A DESTROYER

This part of a destroyer's deck offers damp footing when a great Atlantic "comber" overtakes it. The deep-sea sounding machine, dimly seen through the spray, is the last feather in the fantail.

water, I was caught by the sea which poured aft through a doorway to the forecastle, the water-tight door having been carelessly left open.

It took all my strength to hold on, as the sea slid over the side, leaving me soaked, breathless, and decidedly more wobbly.

"Phe-ew!" I gurgled, "I sure *am* goin' to turn in!"

But sleep was not so easy, as I found after reaching my stateroom. Stripping off my drenched clothes, I rubbed vigorously with a Turkish towel, attired myself in woolen pajamas, and crawled thoughtfully into my bunk. The same lifting of the ship under the heavy seas, with elevator-speed descent into the following trough, caused the springs in the bunk to weave up and down in most irritating fashion.

As the ship was lifted under a wave, it seemed as if I were being swung easily upward in a hammock; when she crashed down, the springs poised at a high peak momentarily, and then, with a sickening rush, hurtled down, stopping with a thud. It was most discouraging.

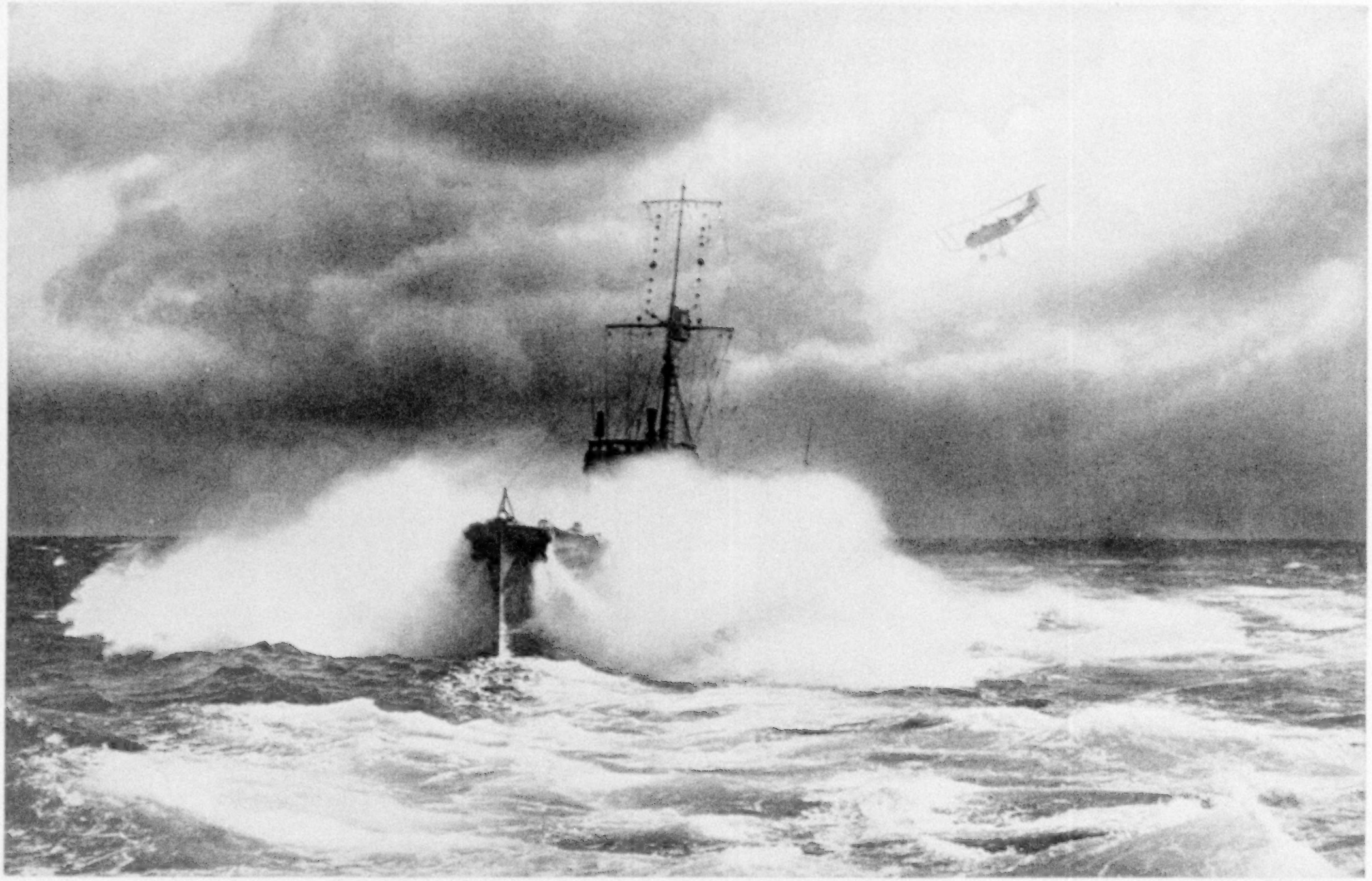
I composed myself for sleep several times, but the ship's antics robbed me completely of all rest. Then, too, the air was becoming stuffy under battened hatches, despite the ventilation blower and electric fan in the room, which were drafty and unpleasantly cold.

There were queer noises of creaking, unlatched doors banging and sliding; even the rings on the curtain across my door jangled. And by no means were my digestive organs tranquil, for the weaving of the springs was also weaving the stability of my dinner. During the course of my efforts at composure I damned the steward more than once for serving a dinner of greasy pork chops and creamed asparagus.

Official Photograph, U. S. Navy

A SEAGOING STRAP HANGER

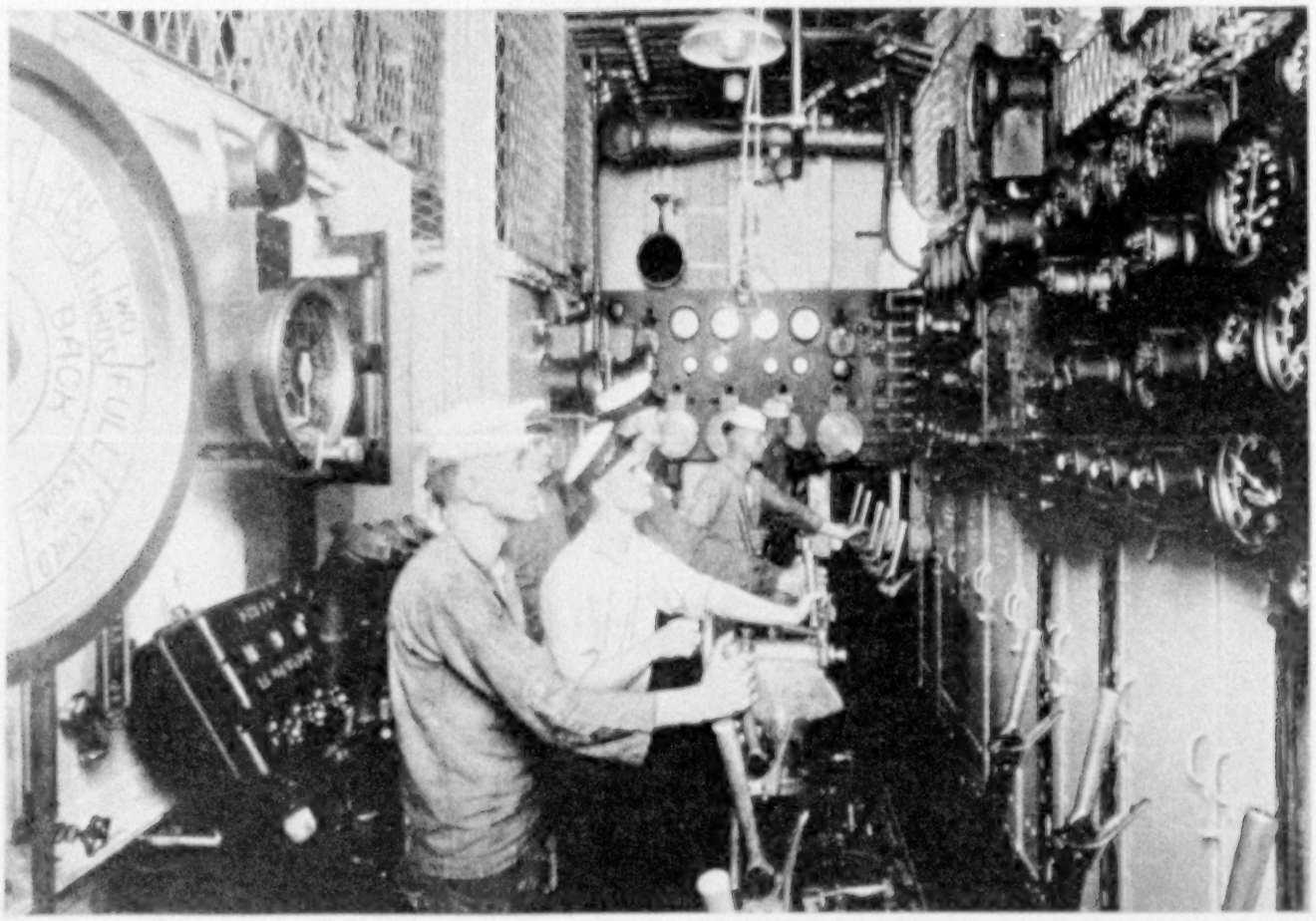
Footing is so precarious on the decks of a destroyer in any kind of rough weather that lines are stretched between various parts of the vessel and short ropes, much like trolley-car straps, are attached, so as to slide along them and provide something for one to hold to. The story is told of a young sailor who failed to hold on to his rope and was swept overboard by a huge wave, only to be picked up by another and deposited on the deck of the destroyer next behind in the line.



© Alfred G. Buckham

A STORMY DAY

This light cruiser has taken a good part of the sea over her bows and is just "coming up from under" again. This is not an uncommon experience in heavy weather, but it is one seldom recorded by the camera.



Official Photograph, U. S. Navy

FULL SPEED AHEAD!

The multitude of levers, dials, switches, and other mechanical devices concentrated here in the control room of the U. S. ship *Tennessee* gives some idea of the magnitude and intricacy of the superdreadnaught.

It was hours, it seemed, before I devised a posture for reclining, but finally attained one resembling that of Mercury lying on his right "statue" side, and in this attitude I drifted off to weary, uneasy slumber. It seemed, too, as if I had not slept more than a few minutes before rude hands were shaking me and a crusty voice was calling me from a far world.

"Mr. Hall! Mr. Hall! Quarter of four! Mr. Page says it's pretty wet on the bridge. Are you awake, sir? Weather's tough. Everybody's sick. Do you hear me? Mr. Hall! Mr. Hall!" Much shaking. *"Mr. Hall!!"*

"Huh? Yeah! All right!" I swung my feet over the edge of the bunk and rubbed my eyes. So this was to be my second day at sea on a destroyer! Why wouldn't the darned ship be quiet!

Dressing was a slow process, for it was necessary to grip something stable with one hand and brace hard with at least one leg to keep from sliding and landing against the sharp edges of the metal furniture.

By eight bells I was on the bridge—weak, but, nevertheless, there. I couldn't see anything on the bridge except the dimmed compass light and the tiny light over the helm angle indicator. The deck was careening and sliding underfoot in a most disconcerting manner.

As my eyes became more accustomed to the darkness, I made out the wing railing of the bridge and gained it. The reflection of the running lights on the waves rushing past wasn't particularly encouraging.

THROUGH TUMBLING PRECIPICES OF WATER

Long curlers, with a 30-foot depth of trough, went whistling past. At one moment the K * * * was in the trough, and at the next was tossed high on a combing mass of seething sea. Then she was sliding rapidly into the next valley, and the shock, as she crashed into the tumbling precipice of water that followed, burying her forecastle under and seemingly knifing it backward, was terrific.

Official Photograph, U. S. Navy

"SHOOTING THE SUN"

This officer is standing on the bridge of his ship making observations with a sextant, from which he will work out his latitude and longitude. The clocklike instrument in front of him is the engine telegraph, by means of which the engineer is kept advised as to the speed desired.

Shielding my eyes from the spray, I tried in vain to see ahead, but found it impossible to glimpse anything from the depths of the watery canyons except the next curler rushing at us.

A heavy form pressed me against the rail.

"That you, Hall?" It was Page. "Well, it's a corker. What?"

"Yes, *sir!*" I found my voice rather faint, and cleared my throat, resolving not to show weakness.

"Come over to the chart."

We pushed our heads and shoulders up through the canvas flap of the inclosed chart board (see, also, page 431).

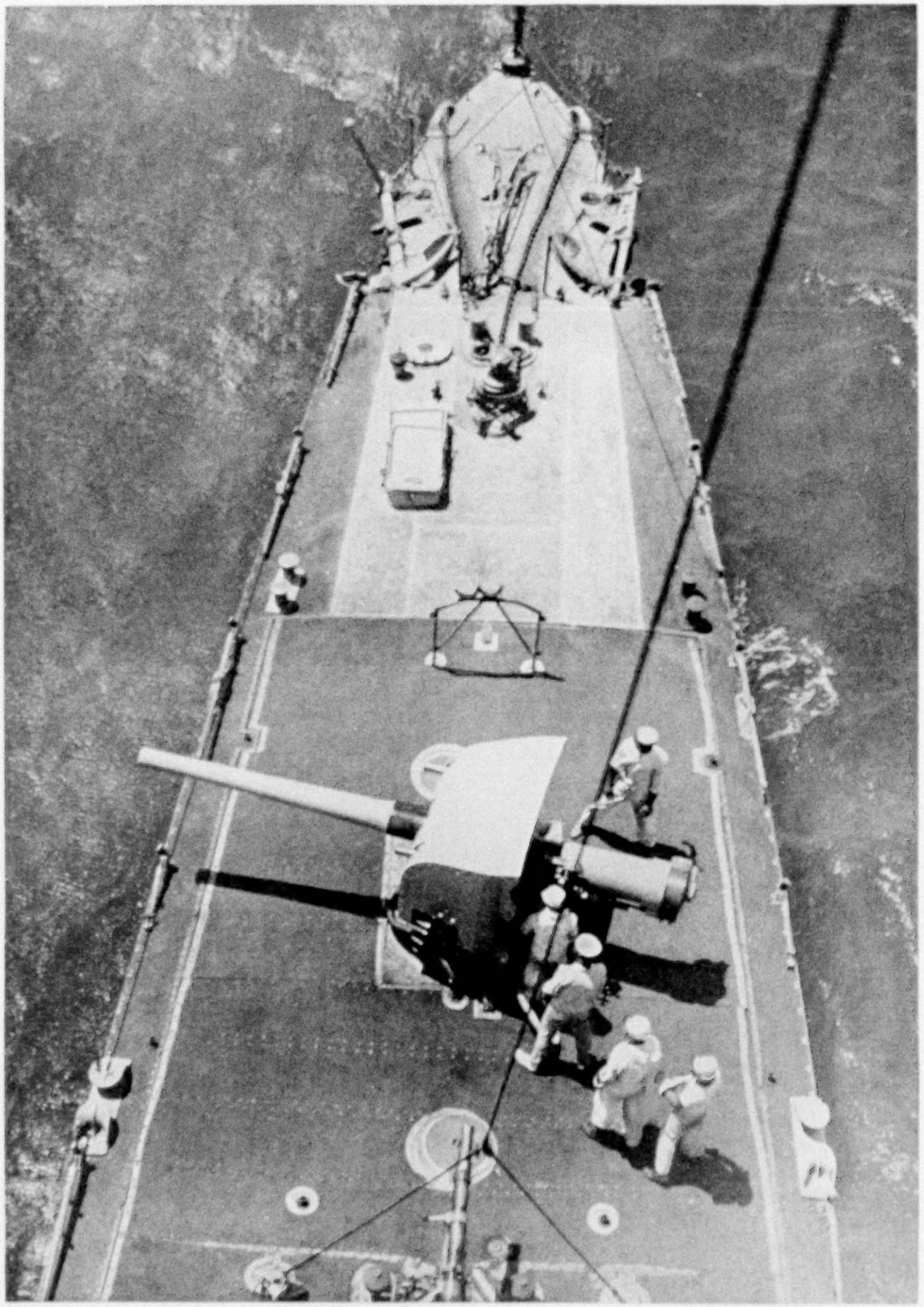
"I think we're about here, Hall," said Page, wiping the salt spray off his hands and face and pointing to a position some thirty miles south and east of Cape Cod Light. "We missed Cape Cod Light and also Peaked Hill Bar Buoy. Just as glad we didn't get close enough to see the light. Didn't stop snowing until about two hours ago; couldn't see a thing.

"Had to slow speed to five knots at 1 o'clock. Seas broke a couple of bridge windows in front of the helmsman and battered up the chart house some. Put oil bags over each bow; keeps down the sea a bit.

"We're heading off Nantucket Shoals—course, 145 true, 162 per compass. You can see I've allowed enough on the course, so we won't be set inshore.

"North Truro is the only radio compass bearing we can get, so that doesn't help much. Surfside radio compass station doesn't bear yet and Cape Elizabeth is out of commission for a month's repairs. Makes it rather hard for navigating."

Page paused, smiled wryly, and continued: "Steering engine room's flooded; ventilator cowl on deck was ripped loose by seas an hour ago; engine's running all right under water, though. Nobody has gone overboard except Pay.'s little French bull, poor fellow. Some ports in the forward crew's compartment are cracked; have to keep the watch bailing out down there about once an hour. Whaleboat's been smashed up a little, but



Photograph International Newsreel

THE DESTROYER READY TO STING WHILE AT FULL SPEED

The anchors, which sometimes prove such life-savers to a destroyer, are here shown "catted," which is Naval parlance for "pulled up on the deck and secured." The bow gun is trained on a target and ready to fire.

Official Photograph, U. S. Navy

OFF TO SEA

He is wearing the Navy's blue for the first time and evidently is happy about it. In less than six months he'll be well filled out and as "hard as nails."

is fast now. Everything else has been secured.

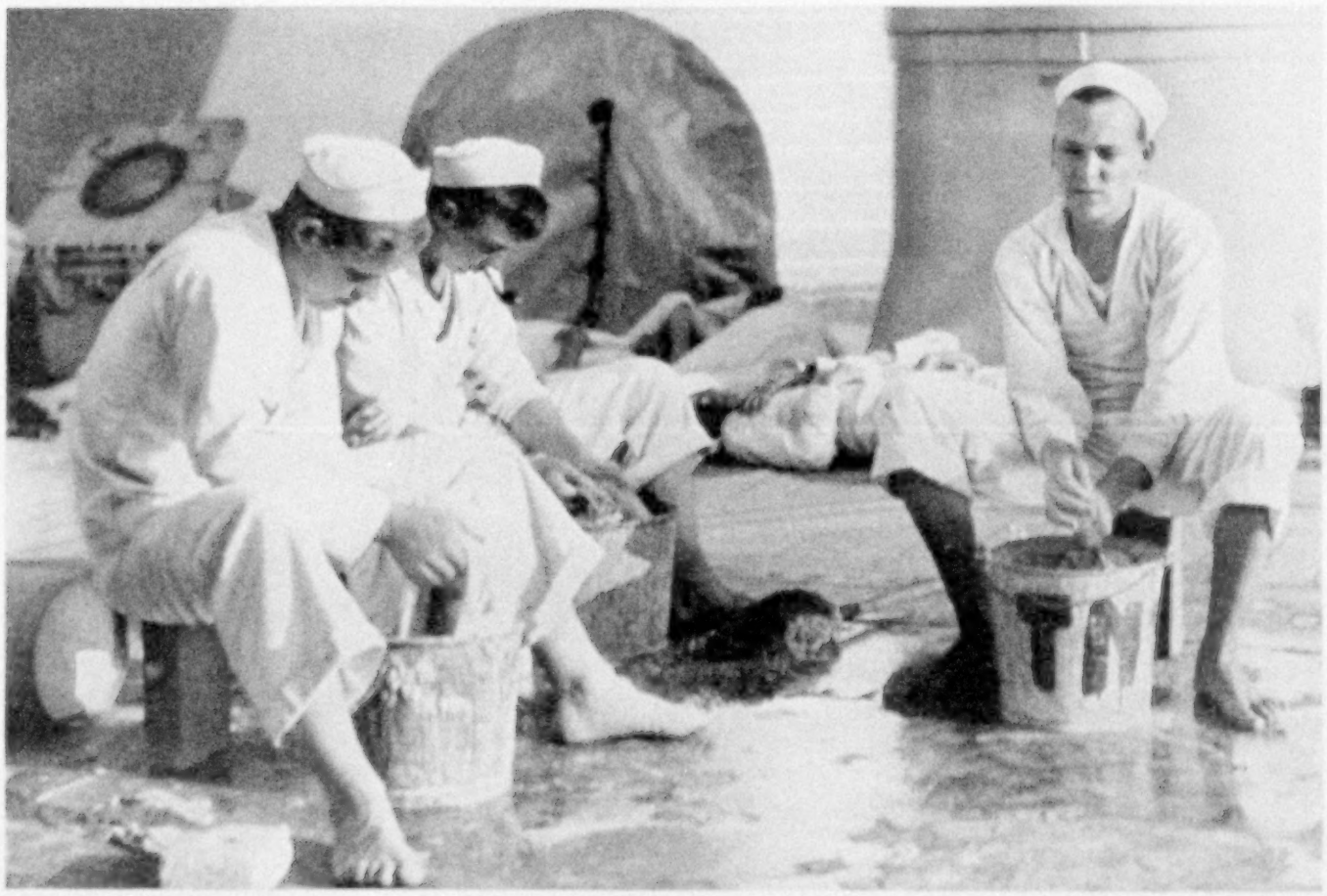
"Barometer's still falling, now 29.28. Wind and sea are hauling around; wind's about a force eight or nine and has gone from southeast to east; probably will continue the circle. Sea has been from southeast, but is hauling east. You can expect a nasty roll before long. Clinometer in the emergency cabin'll tell you how much we roll. If we roll more than 50 degrees, slow down, head up into the sea, and call me.

"Watch has been relieved. Captain's in the emergency cabin. Johnston and the Paymaster are playing dead in their rooms. Atkins seems to be all right. Got everything?"

"I relieve you, sir." I was grinning feebly.

The Exec. looked at me keenly. "Atta boy!" he laughed, slapping me heartily on the shoulder. "Well, guess I'll turn in, then." He withdrew his head from the canopy.

I turned out the light over the chart and, gaining the lee rail, braced myself against the ship's lurching, waiting for my eyes to become accustomed to the darkness. *So we were going to have a nasty roll before long!* Seas were breaking regularly over the forecastle and romping aft to the bridge breakwater. Spray flew aft in stinging sheets, as we drove on, and the salt froze on my face.



Official Photograph, U. S. Navy

DECK LAUNDRY

These boys are making a bucket serve as a washtub and their hands as a board, but the larger Naval vessels now maintain laundries, at which the men can have their clothes washed for a nominal sum.

On the bridge the helmsman and quartermaster were able to stand their watch; the messenger and two lookouts were dizzily holding on, too sick to be of use.

Down below, in the steaming fireroom, I could picture the watch gripping desperately at anything, as they regulated the burners which supplied oil to the boilers.

In the engine rooms I thought of the watch sliding about, as they governed the racing turbines, on floors wet with bilge water, which sloshed up as the ship tossed and rolled (see, also, page 440).

THE GRAY MORNING OF OUR SECOND DAY

The night lightened slowly to a leaden, freezing dawn. I looked out over the gray expanse of waters. The incessant rolling and pitching was wearing down my physical endurance.

At 8, as Atkins came up on the bridge to relieve me, the K * * * drove into a hurtling, massive sea. The long hull quivered and trembled, and as our forecastle lifted from tons of rolling water, a cross-sea caught the bow. Under the impact, it seemed to me that the bridge was rolling from under my feet, as the ship heeled over. From below decks there was a crash of broken crockery and a sliding shock of some heavy weight cast loose.

Slowly the ship came to a stop in her roll, and then whipped back to vertical and over the other way. But the opposite roll was not so great, and, as the water rushed and swirled off the decks forward and aft, I fought my way to the wheel. The ship's head had been thrown forty degrees to the right of the course, and the K * * * was rolling heavily, with her beam now to the sea.

"Where is he?" I heard some one with a gruff voice shouting hoarsely.

LASSOING A BUCKING SAFE

"Mr. Hall!" It was Reilly, the chief boatswain's mate. Shirtless and hatless, his hair tousled, Reilly came toward me hand-over-hand on the bridge railing. "Mr. Page says to slow down and head up into the sea. The Paymaster's safe is cast loose!"

Wide World Photos

"TAKING A REEF"

Men do many things at sea that they never did at home, including the mending of torn garments. This open-air tailor shop on the deck of a destroyer appears to be doing a "while-you-wait" business.

In a quick leap I reached the annunciators and rang up one-third speed, directing the helmsman to put on full left rudder. As we hauled around laboriously, I swallowed; my knees felt a trifle shaky. The safe, which was in the wardroom, had been lashed. Evidently the heavy roll had snapped the lashings. That must have been the shock of heavy weight I had felt so plainly.

I bethought myself to inform the Captain; but the Captain was not in the emergency cabin. I sent the scared and seasick messenger to tell him, then turned the watch over to Atkins.

Anxiously I hurried below. To have this ton-and-a-half juggernaut sliding and crashing against the steel sides of little better than eggshell thickness was threatening, serious.

In the passageway to the wardroom a big form crowded past me.

It was Page.

"Just about got her!" he shouted. On his arm was a coil of heavy line. As he stepped into the doorway the ship rolled heavily; a warning yell came from husky throats. I had a vision of a black object sliding and battering past the door, and then Page disappeared. A groan, a splintering of wood, glass, and metal, and then a rush of men. I gained the doorway and saw a handful of burly men straining at the safe, hauling it away from the metal sideboard into which it had crashed.

"Reilly!" Page yelled. "Lasso 'er! Lash it between the stanchions in the middle of the wardroom!"

Struggling and gasping, the men carried out Page's directions. I jumped in to help, and found the Captain and Page shoulder to shoulder with me. The line which Page had brought with him soon inclosed the safe, the mass of broken chairs, the twisted metal dining table, and the splintered victrola cabinet.

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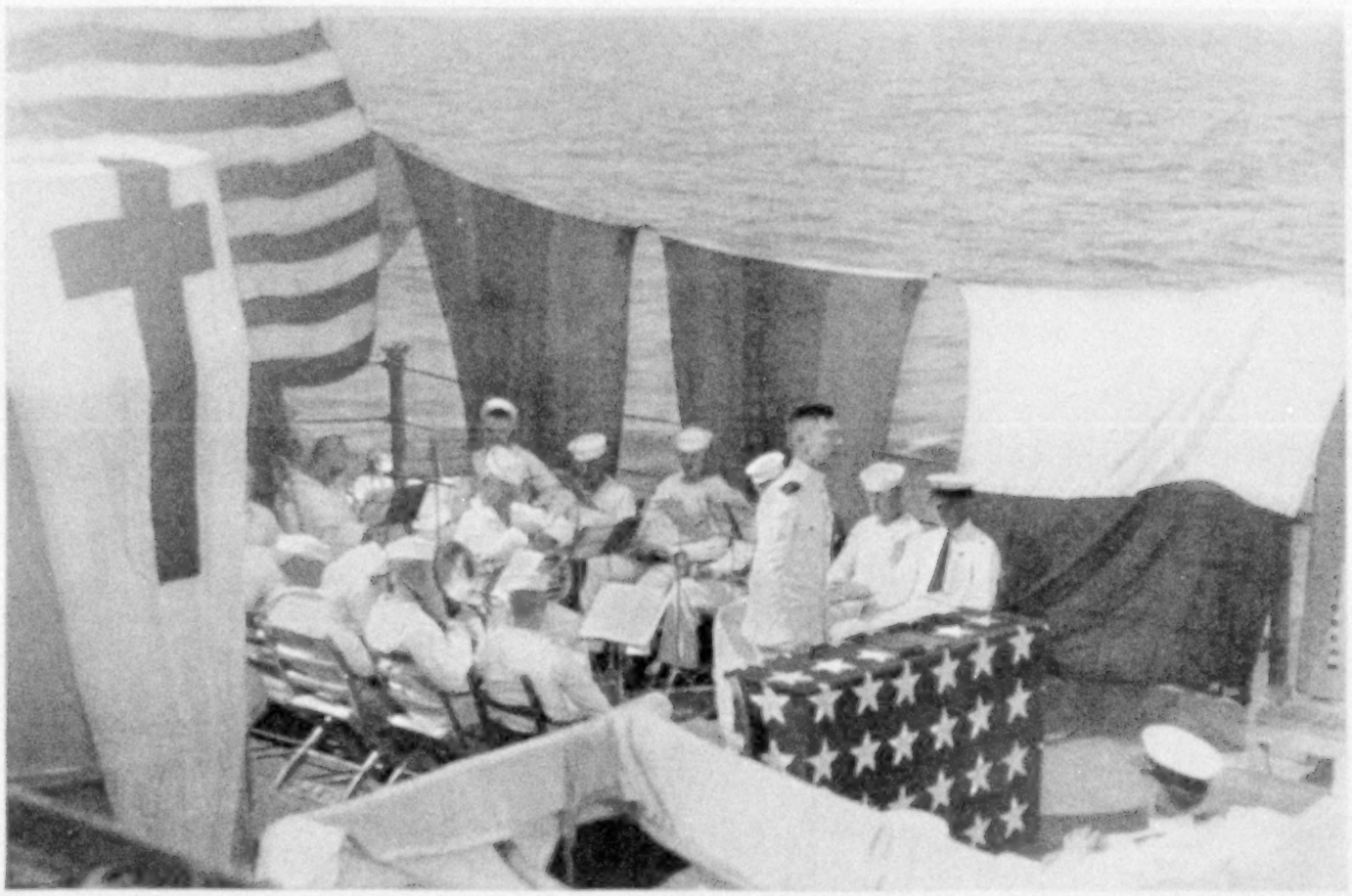


Official Photograph, U. S. Navy

THE SKY-PILOT'S DAY

The ship's band furnishes music for the church services conducted on board. The church pennant, to be seen at the left (blue cross on a white field), is flown above the national emblem during divine services. This is the only flag that enjoys such distinction.

I heard Page's voice in my ear: "Damned thing nearly went through the side; the starboard transom got the first dent. Don't see why the Pay. couldn't invent a lighter box to carry his cash in."

I gazed long at the buckled and splintered transom, driven in almost to the ship's side, and shuddered.

The men completed their work. I wandered to my stateroom. Tugging and pulling at my wet clothing, I finally threw myself upon my bunk, drifting off to exhausted slumber.

A VISIT TO THE GALLEY FOR REENFORCEMENTS

When I awoke the dull afternoon light showed me by my wrist watch it was almost 1 o'clock. I decided to get on deck, fill up with air, and also pay a visit to the galley. The sea and wind were from almost dead astern now, picking us up and lifting us along viciously. At times the seas romped up and swarmed over the after decks, and at other moments a speeding green mountain got under the counter and careened us over until it seemed to me our foretopmast would dip water.

After reënforcements of a hot beef sandwich and a cup of steaming "Java," I clambered up to the bridge. Johnston was on watch and greeted me with a feeble wave.

I returned the salute. "How's she steaming, John?"

"Rotten, thanks. Boilers are salted up badly—and so am I. I can't imagine what it was I ate before we left 'Bosting,' but I feel inside like a wriggly eel. No thanks to the Exec., either, for putting me on watch."

"Where's the Exec. now?"

"In the emergency cabin with the Old Man, doping out where we are."

WE CHANGE OUR COURSE

I looked through one of the emergency cabin ports. The Captain, bending over the chart desk, looked up and proposed something to Page. The latter agreed and the Captain stepped out of the cabin.

Official Photograph, U. S. Navy

SEAPLANE AND DESTROYER

The narrowness of the destroyer is well illustrated by the fact that the wings of the seaplane reach entirely across its deck and extend to the vessel alongside.

"Johnston, change course to west. You may have to slow speed a little, for the new course'll bring the sea on our bow. By dusk we may see Nantucket Shoals Lightship, so keep your watch alert."

As the K * * * was headed west, I stepped aft and into the emergency cabin.

"How's she steaming, Mr. Page?"

"Pretty rough, Hall. Picked up speed to ten knots at 9 o'clock this morning, and that helps some. Hope the Captain slows down on the new course or we'll get an awful hammering. Not much sleep the rest of the trip, I guess."

As we approached our new course, the K * * * 's laboring increased. By the time we were west by compass, we were alternately lifted high and rolled over by each crested sea, and then dropped like a pile driver into the following canyon. When we struck, the hull quivered and strained to rise under the weight of water which flooded the forecastle. It was on the third crash that a splintering and sliding from overhead occurred, and our radio aërials, sparking from an outgoing message, snapped and fell from their waving heights to the upper decks.

"No one can repair that in weather like this," Page remarked laconically. "No chance of aid now from radio compass bearings."

I stepped out on the bridge and saw the radioman who had been on watch strip

Official Photograph, U. S. Navy

"CHOW"

But one not versed in the slang of the sea may wonder what it is all about when he hears a table lined with gobs calling for "Java" (coffee), "slum" (stew), "red-eye" (catsup), "sweet sand" (sugar), and "shiverin' Liz" (gelatine).

away the broken spreaders and twisted antennæ. A wet flake dropping on my nose broke my somber train of thought. I looked up. It was snowing again, and over toward the west the sky was black. A rumble of thunder came to my ears, and off to the southwest a thin fork of lightning shot down to the horizon.

"Will you look at that!" I thought. "All the weathers together! More—and yet more."

Wondering what was coming next, I sought my restless bunk for a possible short nap before my four-to-eight watch.

When I came up on the bridge at eight bells, the snowstorm was being driven by a vigorous, freshening, northwest wind. The Captain was on the bridge.

"Haven't seen a thing of Nantucket yet, Hall." Captain Welles' lips were drawn. "Page thinks we'd better take soundings at half-hourly intervals, so start them at 5, in case we don't see the lightship. Let me know when you have one or two."

After I had taken over the watch, I peered out into the thick veil. We were walled in almost completely, wallowing and careening under the intensified rush of seas which leaped out from the white drapery and vanished into the opposite curtain of snow.

By two bells it was dark. Nothing had been sighted, so I sent for Stearn. Soundings began to come up regularly. The light in the emergency cabin was suddenly switched on. Startled by its comparative glare, I peered in through one of the open ports. The Exec. was bracing himself and checking over the soundings.

"Forty-five fathoms, fine gray sand bottom, was the last, Stearn?"

"Yes, sir. And this one is 36 fathoms, same bottom."

Official Photograph, U. S. Navy

"PEELIN' SPUDS"

These young men should be well trained in domestic arts as well as in the ways of war. They get lots of this kind of experience, for the Navy is a great potato market.

Page laid down the soundings, distance made good, and course steered, on a strip of transparent paper and slid it over the chart. At last he found chart soundings to correspond with those taken.

"H-m-m-m. Puts us fifteen miles south of Nantucket Shoals Lightship, roughly, eh? Let me see—24 hours should put us off Cape Henry, if we steer about 236 true and make fifteen knots in this sea. Tell Mr. Hall I want him. Oh, you there, Hall! Will you send a messenger to the Captain—ask him to please step up here?"

The Captain came on the bridge, checked over the chart navigation, ordered the course changed and speed increased to fifteen knots, cautioned all hands to keep alert, and then went below decks again to his cabin. We ground on, whipped and buffeted by seas which, because of our increased speed, seemed to rush at us with anger.

OUR THIRD DAY OUT

It was not until the dawn of our third day at sea slowly unveiled the sky that the gale had lightened its intensity. I was on deck again with the four-to-eight watch. Page, who had slept in the emergency cabin, called for the messenger. I stuck my head in at the lee port of the cabin and managed a grin. "Helmsman, quartermaster and I are the only ones on our feet, sir."

Official Photograph, U. S. Navy

"UP AND OVER"

Something is always being scraped and painted aboard a man-of-war. The peculiar seat used by these sailors who are engaged in painting the smokestack is known as a "bosun's chair."

Page smiled back. "Well, I'm coming out to look around."

He gained the lee rail and I joined him. It had stopped snowing before daylight, but the skies were heavily overcast and the seas were rolling high, even to the horizon.

"Don't think we'll see the sun to-day, do you, sir?"

The Exec. slanted his eyes upward. The wind was dying down but slightly, leaving little prospect of dispelling the snow-laden clouds massed overhead.

"No. We'll have no sights and probably won't see anything to help us until to-night. Then, by George, we'll have to pray that our dead-reckoning line is right, our seasick helmsmen haven't thrown us more than ten miles off that line, the engines have been pushing us according to Hoyle, and the Virginia Cape lighthouse keepers don't have apoplexy about eight bells."

He paused reflectively, and then went on:

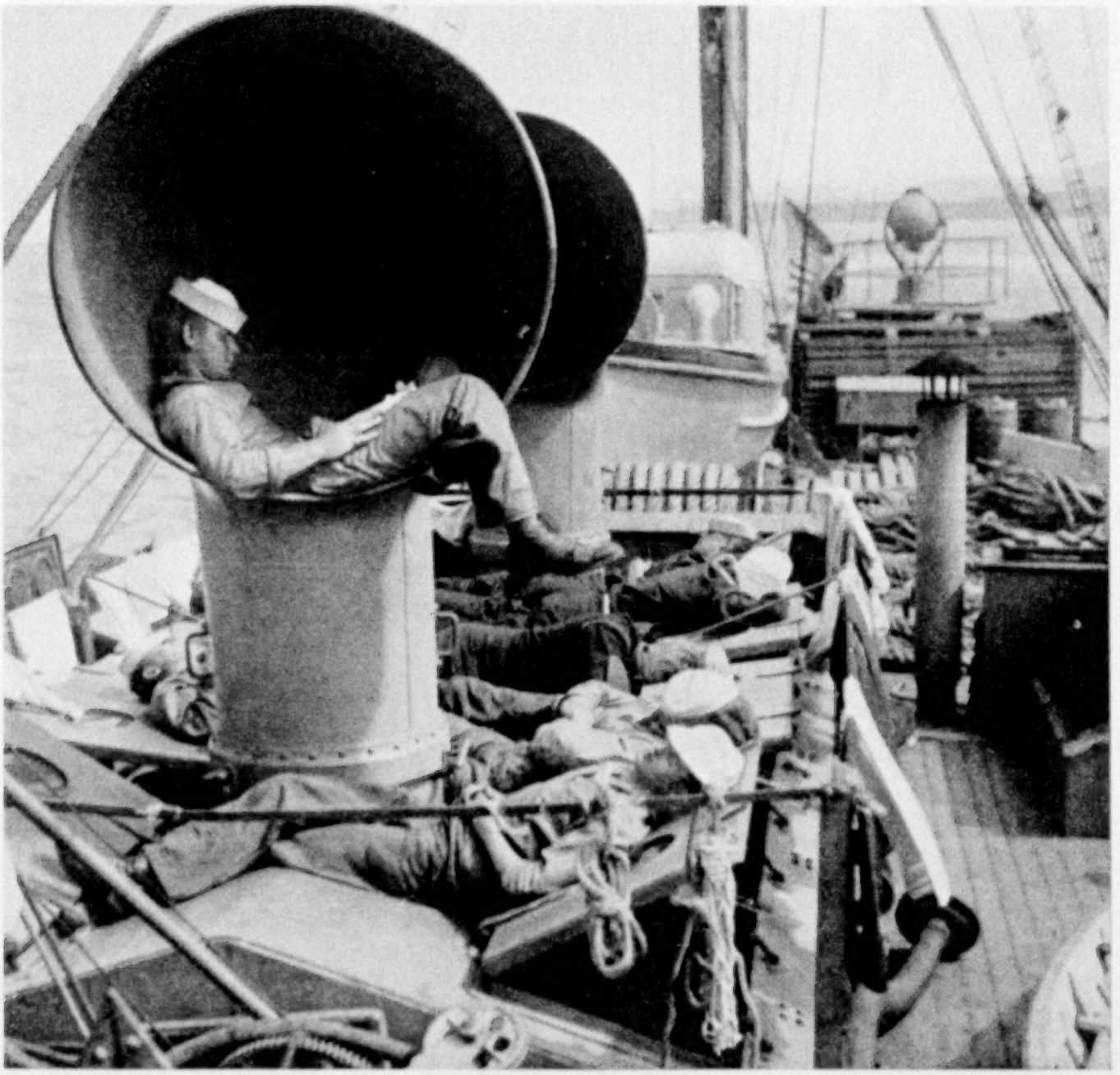
"This is the first time I've ever been this long without seeing sun, moon or stars, or some light, or having a radio compass bearing. Six hundred miles around corners without some reassuring touch is my idea of a whale of a good start for the southern cruise."

"Check!" said I, with feeling.

FEELING OUT THE SHOAL, ATLANTIC SHELF

Despite the fact that the wind was relaxing its vigor, the sea was still remorselessly rushing at us, but from a different direction, having hauled back around to nearly astern, pushing us along.

The air was penetrating to the marrow. It continued in this way throughout the daylight hours. About noon the monotony was broken when an eastbound tramp was sighted to the southward, her cumbrous bulk



Official Photograph, U. S. Navy

OFF WATCH

Although there is much to be done at sea, there is still some leisure time, when the weather's fair and the sea calm. A part of the skipper's gig may be seen a little to the right and above the middle of the picture.

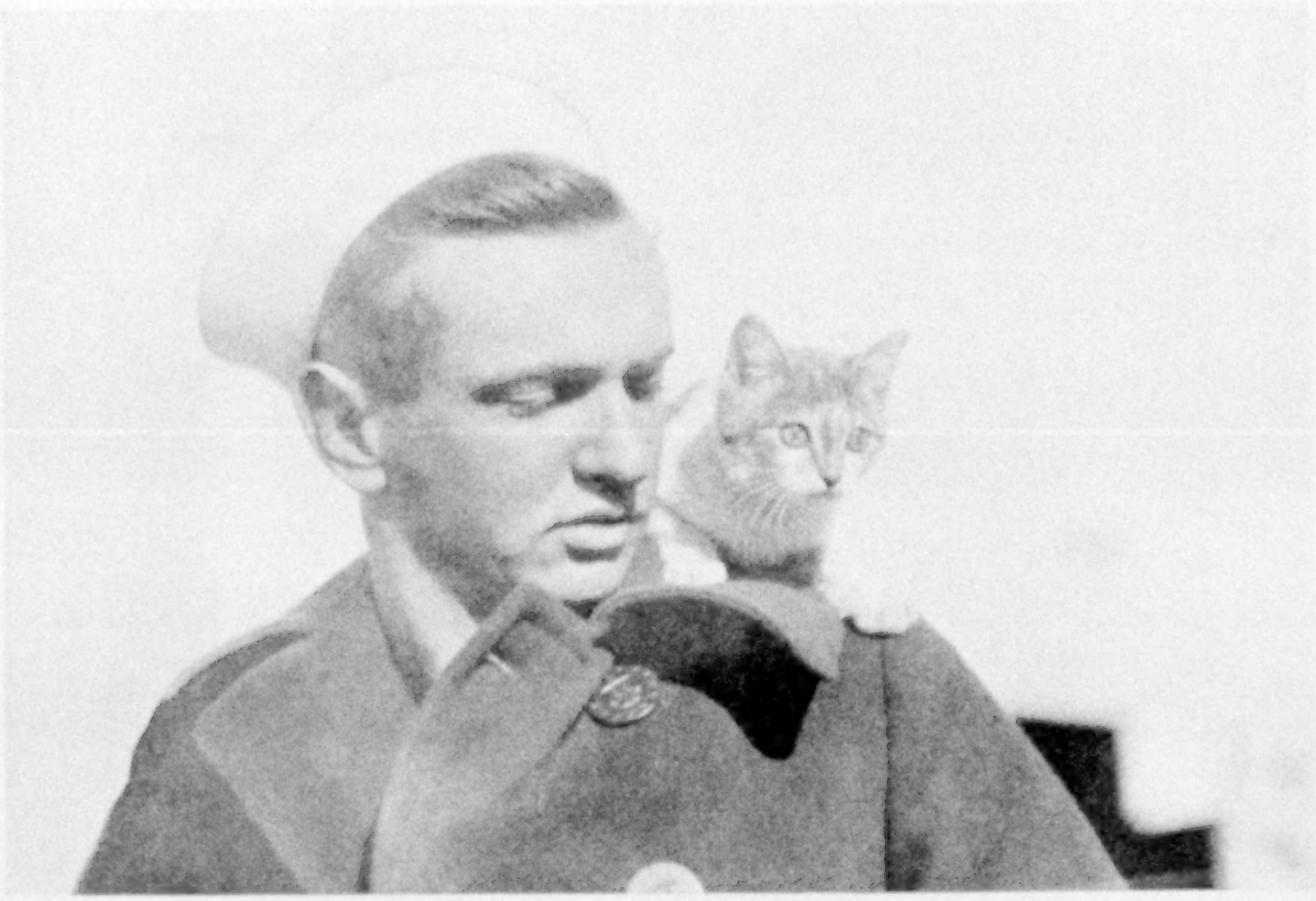
tossing back walls of foaming white. As dusk began to settle, I came up to relieve Johnston.

"Captain says to have soundings taken every half hour, Kewpie. We're getting in touch with the bottom again, but no one knows whether we're steamin' for Chesapeake Bay or the Panama Canal. Captain's inside the emergency cabin now, plotting the last batch of soundings, and he's sure worried. When you land on the beach, be sure to let me know, will you?"

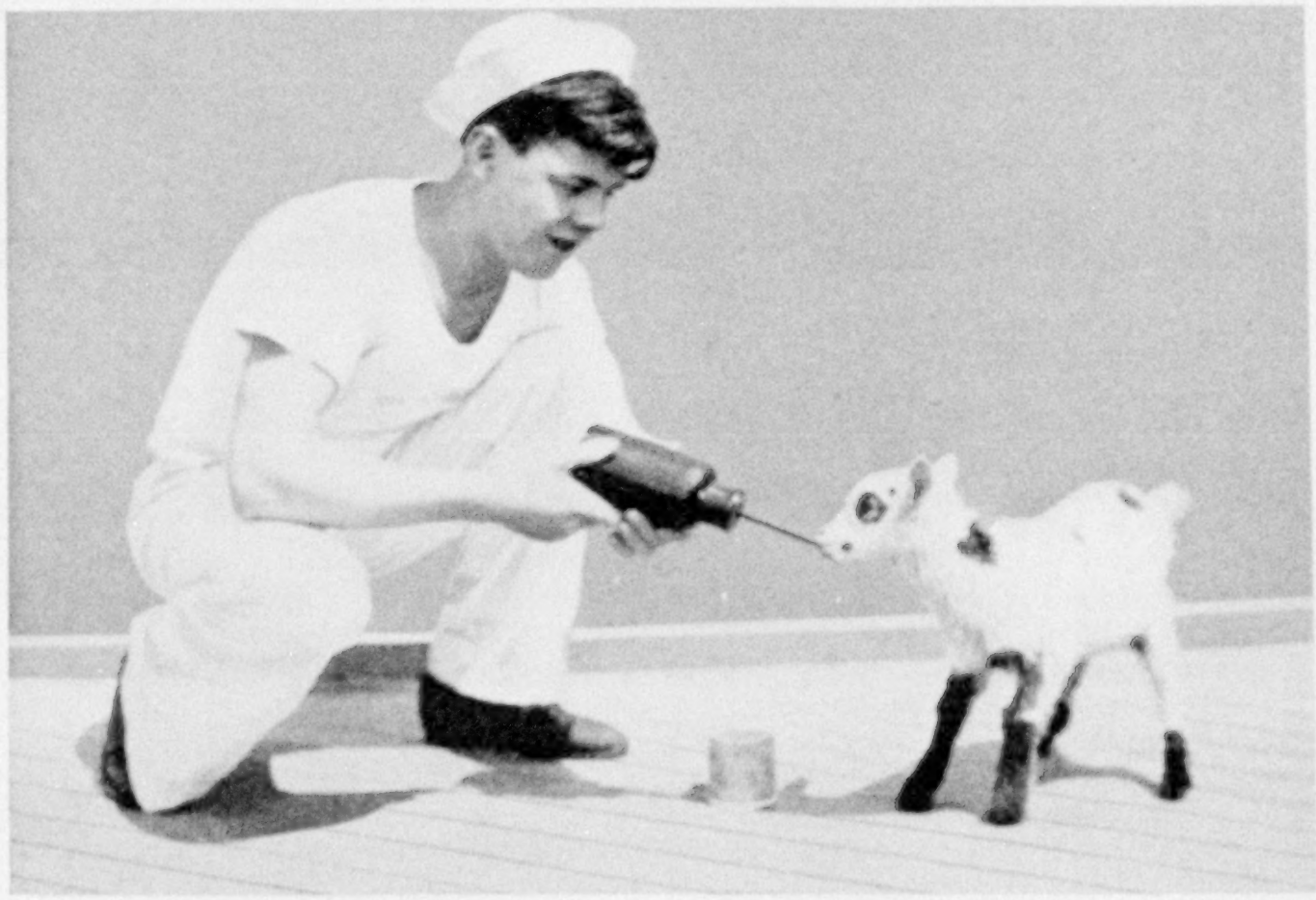
I braced myself near the compass and tried to see ahead. The glass was covered with frozen spray, so I gripped hard at the emergency cabin railing and finally reached the lee wing of the bridge, peering out into the dusk. The K * * * was slashing and swashing along doggedly. Worn as I was by the continual physical punishment, my nerves thoroughly shaken by the pounding effect of the seas, I let my mind dwell on Johnston's jocular remark.

When, at 7 o'clock, the sounding taken showed 56 fathoms, gray sand, I hurried to the emergency cabin. Page was plotting the sounding. The Captain was sitting on the transom, his elbows on the chart desk, chin cupped in hands, watching the results.

"Can't tell much yet, Captain," Page



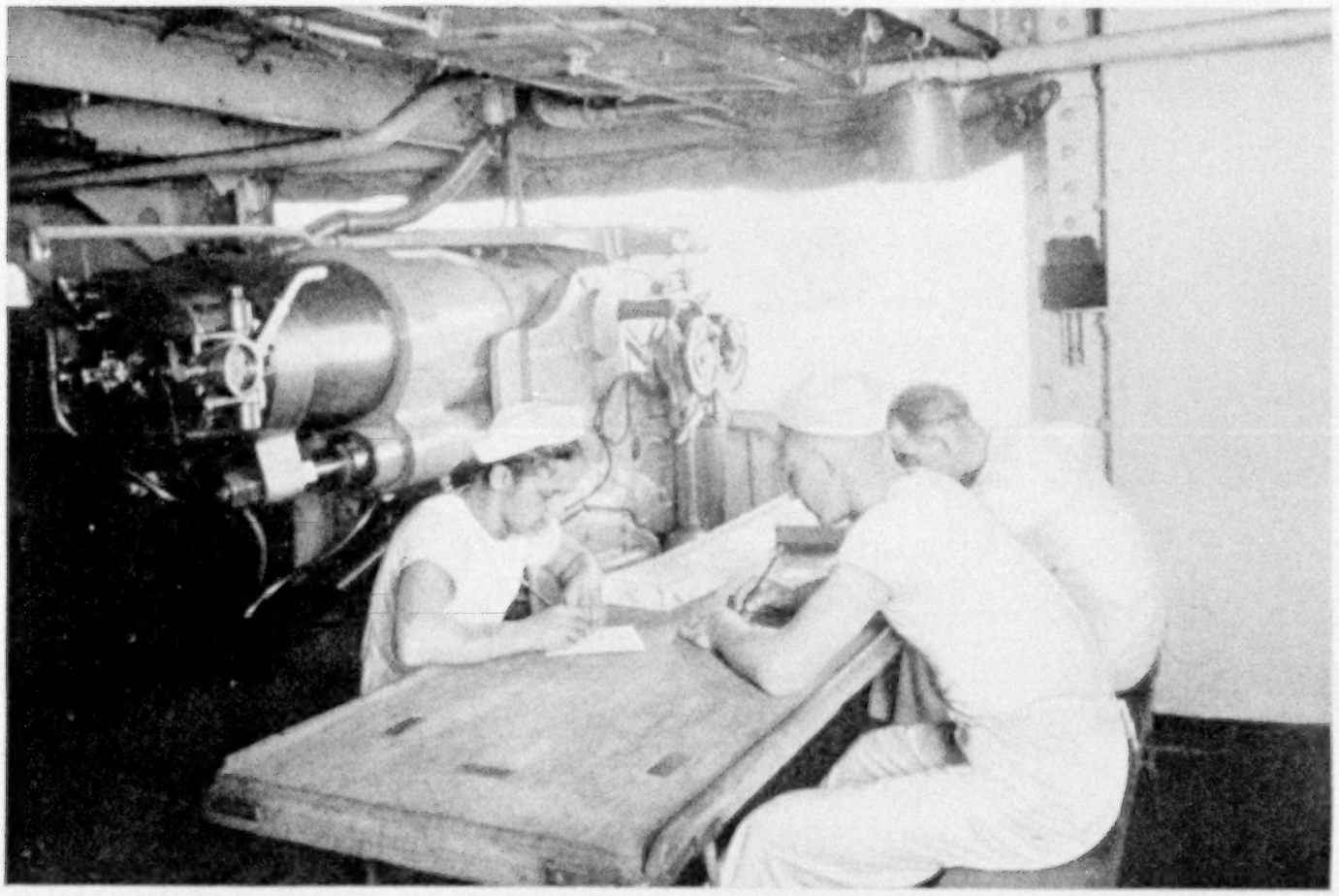
PALS



Official Photographs, U. S. Navy

A COUPLE OF KIDS

The young "gob" is playing nurse to the ship's mascot, who seems to enjoy being a bottle-fed baby.



Official Photograph, U. S. Navy

WHERE SEA TALES ARE MADE

These men are writing on a mess table which hooks on to the ceiling when not in use, and is thus completely out of the way. One thing a sailor never lacks is interesting news for his letters home.

remarked. "That's sure enough. Another sounding or two may help us. If we have made anywhere near our speed or course, we ought to see either Cape Henry or Cape Charles Light by eight o'clock."

As soon as Atkins had relieved me at eight bells, I wrote my log for the watch and then went into the emergency cabin.

"It's about 8:15, Page." The Captain was speaking. "The last sounding was 42 fathoms, and the bottom makes me believe we're south of the Capes, about an hour behind in distance. Think we'll be all right if we change course to northwest. Ought to sight Cape Henry or Buoy 2CB in half an hour."

Stearn, who had stuck his head in the cabin doorway in time to hear the Captain's last words, grabbed a telescope out of the case. I followed him out on the bridge and watched him as, clinging to a bridge awning stanchion, he began a determined search of the horizon for lights, pausing only at intervals to wipe the spray off the lens. As he concentrated on his search, he looked up and whistled.

DANGER SIGNS AHEAD

"Sir, there's a heavy haze hanging low on the water toward the west. Can't pick up much."

The Captain, who had come up beside me, was galvanized into action. "Atkins, we've got to double our lookouts! Pick out a good man to send aloft, too, with a pair of binoculars. He may be able to see over the haze. It'll be heavy work up there, hanging on, so he's got to be a husky. I'll slow down soon, unless we sight something."

Here was my chance for proving myself, I thought.

"Captain, how about me for a foretop lookout?"

"Certainly, Hall! By all means!" The Captain, seemingly pleased, slung a pair of binoculars around my neck. I removed my cap and started precipitately for the flying bridge.

"Here, Hall"—Page was pulling off his

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SEAMEN THREE

Seagoing pets are often trained to do all kinds of tricks and stunts, their sailor friends devoting many an hour to their proper education.

woolen gloves—"take these. It will be pretty cool up there."

"Be careful now!" was the Captain's final warning.

BREAKING AWAY FROM THE ODIUM OF "MAKEE LEARN"

As I started my ascent I was reminded that I should be cautious. The steel ladder rungs were glazed with ice and, my feet slipping, I rapped both shins smartly against the next higher rung. The rungs were treacherous to the grip; it was all I could do to hang on by my hands. I began all over again by wrapping my arms around the uprights and bracing my legs as I went up slowly, step by step.

As I went higher, the swaying of the long mast, as the ship lurched drunkenly, caused me to look down. Thirty feet below I could see the light from the emergency cabin. The glare of the running lights revealed the spreading phosphorescence on either bow. Close underfoot, the white masthead light offered nearer companionship.

Climbing on, my arms chilling and stiffening, I pushed head and shoulders up through the trapdoor in the crow's nest and in another moment was inside. Closing the door underfoot, I began searching with my naked eyes all around where I imagined the horizon should be. I could not see the dividing line between the sea and the heavens.

The weaving of the mast caused me acute annoyance when the ship pitched and lurched; the shock of the crashing water came up through my feet, vibrating and shaking the tiny crow's nest as if it were a rat in the jaws of a terrier.

I could see nothing for a time, and, pulling off the gloves, I adjusted the binoculars to my eyes, searching where I thought the horizon should be, from beam to beam, occasionally wheeling to look astern. The cold wind whistled through the crow's nest, chilling me and stinging tears into my eyes. It was as if I were in a world by myself up there—a cold, misty, stinging, waving world. I looked over the edge of the crow's nest to get a comforting touch in the way of seeing the ship's lights beneath.

As I looked up again, a tiny light

flashed somewhere there, close on the starboard bow. I caught my breath and tried to focus my eyes on the exact bearing, as the mast weaved over and back. It came again, but was lost in the foglike haze. I couldn't afford to wait. Fumbling with numbed fingers for the bell to the bridge, I pushed it, then yelled down the voice tube.

"Captain there? . . . Captain, there's a flashing white light almost broad on the starboard bow!"

The query shot back, "A flashing light? . . ."

That was all I heard. I rang the bell again, but could get no reply. The ship seemed to be continuing her course and speed. If that light were Cape Henry, we were heading for the shoal shelf off Virginia Beach! I looked again for the light and located it; it seemed nearer, brighter. Two short flashes and then a long flash—Cape Henry! I pushed the bridge bell frantically and shouted down the voice tube. No answer. I tore open the trapdoor and, half sliding, half falling, started the slippery descent. As I reached the masthead light, clouds of white smoke began rolling from the fireroom stacks. The acrid fumes gagged and blinded me, but I reached the flying bridge.

There I paused for just a moment, for down on the bridge all was darkness; there were sounds of men scrambling about; orders being shouted. Above me, the masthead light suddenly flickered out. I caught the words of some one passing under my feet—"Lost oil suction in the firerooms!"

Official Photograph, U. S. Navy

SMILING AT A SCOLD

When the fleet returns from a southern cruise the decks often look like a menagerie in transit. Many small tropical animals and birds are brought back, but monkeys and parrots predominate.

I slid down to the bridge and in the darkness found the Captain.

"That's Cape Henry, Captain!"

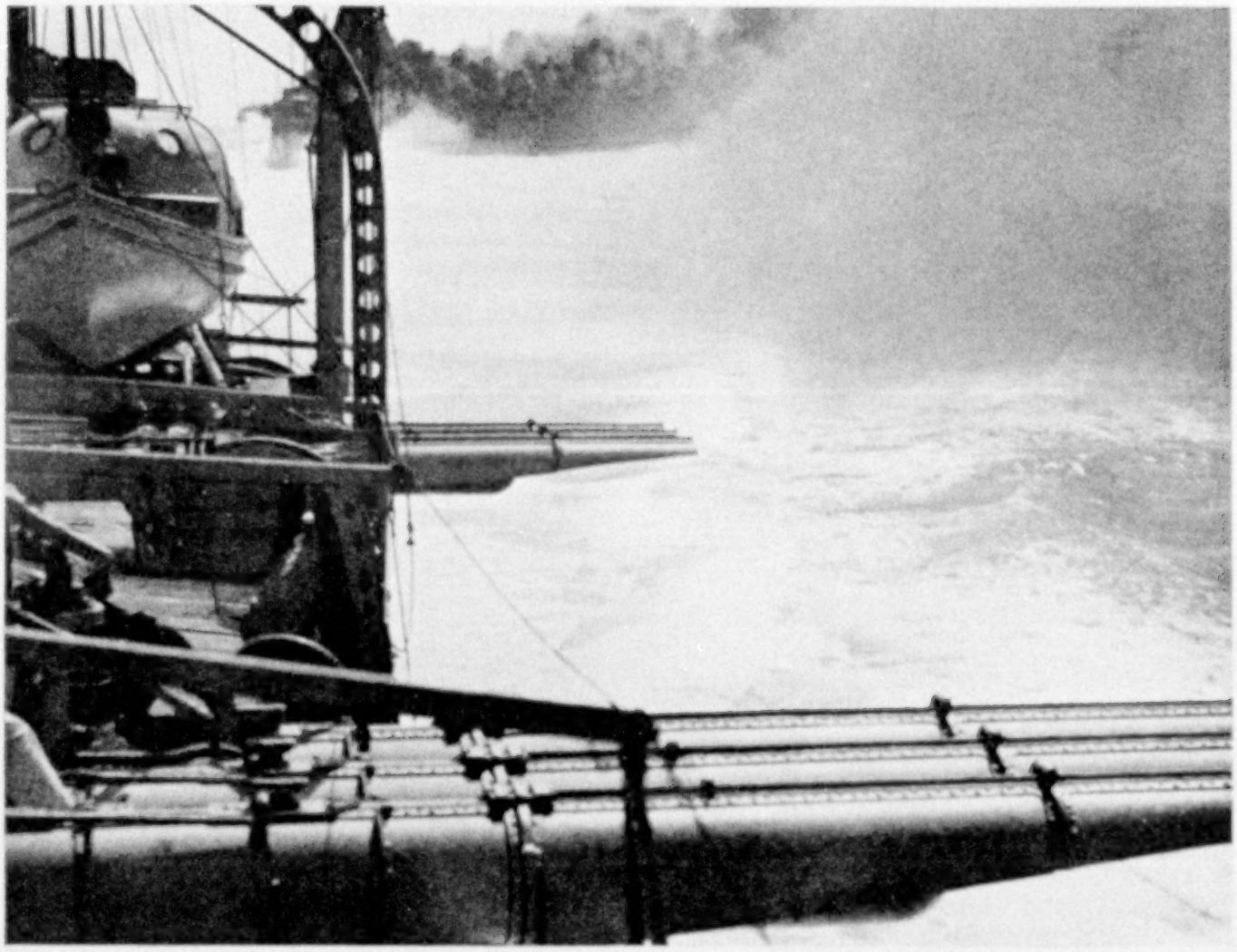
ENGINES FAIL, ANCHOR DRAGS

"What? Oh, yes, Hall! Fireroom has lost oil suction—no power. Oil barge at Boston must have had some water in that lot she gave us, so we're being washed and drifted along onto the beach just now."

"Look there, Captain!" I pointed.

The haze had thinned for a moment and Cape Henry Light was plainly visible.

Gripping my arm, the Captain shouted in my ear, "Anchor, Hall! Get Reilly—"



Official Photograph, U. S. Navy

READY FOR A TORPEDO BROADSIDE (SEE, ALSO, PAGE 458)

I struck out for the bridge ladder, spilling over two of the scared watch.

"Reilly! Reilly!" I shouted, as I landed on the main deck. The big boatswain's mate was a welcome figure, as he stood there at the foot of the bridge ladder, an oil lantern in his hand. "Here, sir!"

"We're going to anchor!"

Clinging to the lifelines on the forecastle, we fought our way to the eyes of the ship. As the K * * * rolled and staggered, we cast off the lashings, drove out the stopper, released the compressor, and in but a moment—no more—the starboard anchor jumped off the billboard, the chain rattling as it ran and throwing a whirl of spray off the unreeling wild cat. A roar through a megaphone came from the bridge.

"Veer to 90 fathoms!"

As the chain took the strain, the ship hauled around, head to sea, pulling and heaving mightily on the thin links of steel. Treacherously the anchor slipped, caught for a fraction of a minute, only to be yanked clear by the surging strain of the ship.

I secured the chain and returned to the bridge. Johnston was there, too.

"Be ready in about ten minutes, I think, Captain," he was reporting.

The Captain was unmindful of the engineer's words. He was watching Page check the bearing of Cape Henry Light. A hail from the forecastle leadsman, "Ship's dragging, sir!" verified his suspicion. Only then did the Captain reply.

"Ten minutes. H-m-m! We're dragging to the beach. Atkins, you here? Have all men on deck! Close all watertight doors!"

A TOUCH OF SEAMANSHIP

By the light of oil lanterns I saw men pouring out of the hatches from the living compartments, sleepily cursing. They listened quietly to Atkins' sharp, brief commands; then went swiftly to their assigned stations. "The other anchor, Captain?" Page was asking.

Official Photograph, U. S. Navy

BECLOUDING THE ISSUE

Destroyers are useful not only as convoy and patrol boats, but also play an important rôle in actual "battle-fleet" engagements. There they launch their torpedoes at the larger ships of the line and dart away under cover of a smoke screen. Notice the scout planes flying above the smoke and thus enabling their fleet to see beyond the dense screen put up by the destroyers.

The Captain nodded. "Hall! Get Reilly to help you."

I reached the forecastle, Reilly faithfully at my heels. In a trice the port anchor was over, and as the strain was taken off the dragging starboard anchor, the port anchor seemed to grip and hold at the 30-fathom mark. The ship swung off on its new lead of anchor chain, and as this happened I eased the port chain slowly out of the hawsepipe.

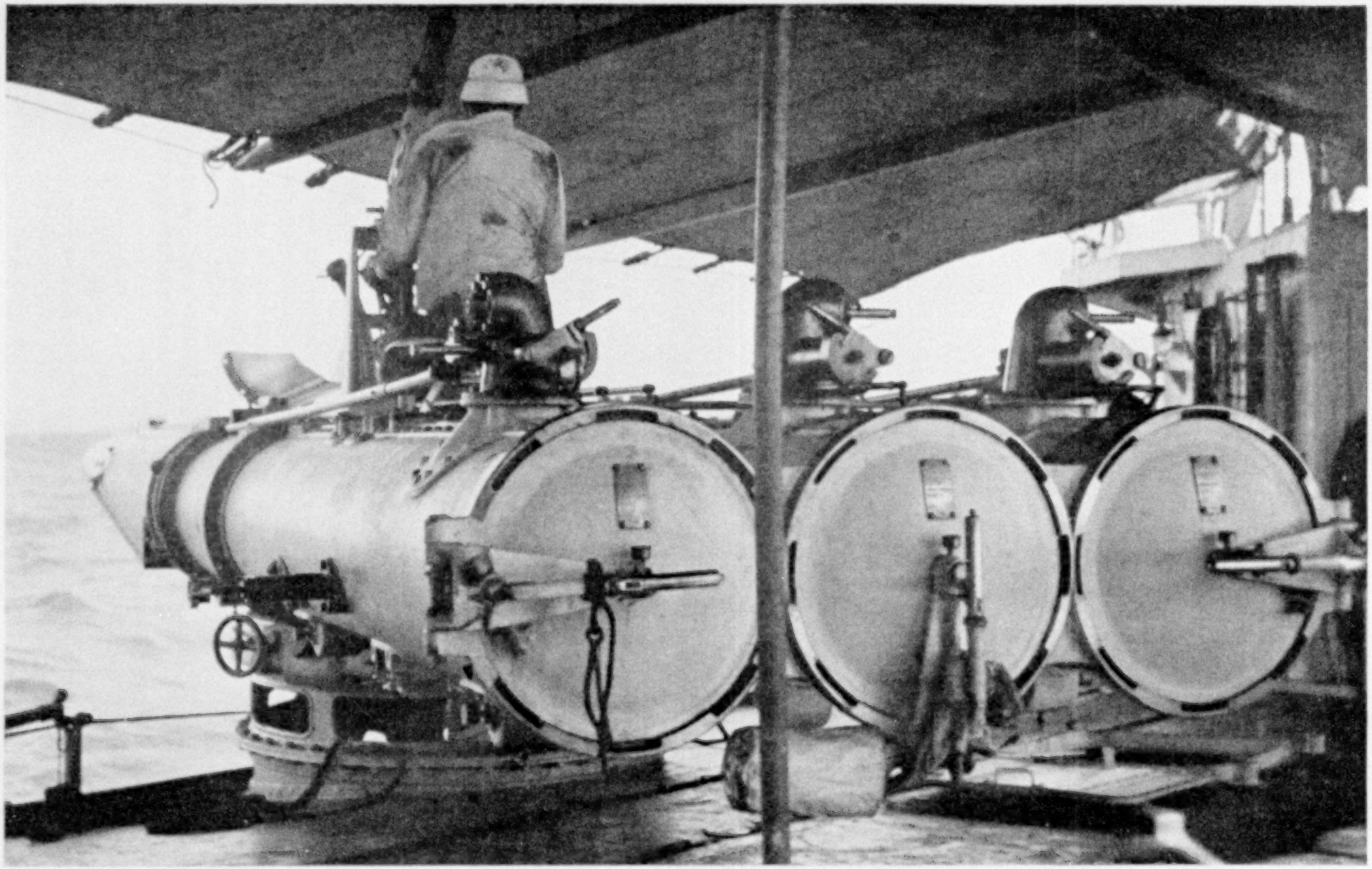
Desperately we clung on, as the bow was pitched high, vibrating the chains till they sang taut, and then crashed down. As the strain took on both chains, the forecastle dug into the huge waves, carrying us under. The tearing force of the green water wrenched and twisted our arms. After what seemed to be an eternity, we again drew in free air.

"Better get out of here, Mr. Hall!" Reilly sang out, choking and sputtering. Choosing our moment, we dashed aft, holding grimly to the lee lifeline. Abaft the break of the forecastle we stopped for breath.

Farther aft, the men not on watch were standing ready in life jackets around the big life rafts. On the fantail, Stearn was heaving a hand-lead; the water had become too shallow to bother with the sounding machine. Calmly, methodically, as if it were merely a drill, he dropped the lead over the side, plumbing the depth and noting the mark in his hand by a flickering lantern held by a scared youth. The result was transmitted to the bridge by voice tube.

GETTING THE LIFE-GIVING OIL TO FLOW

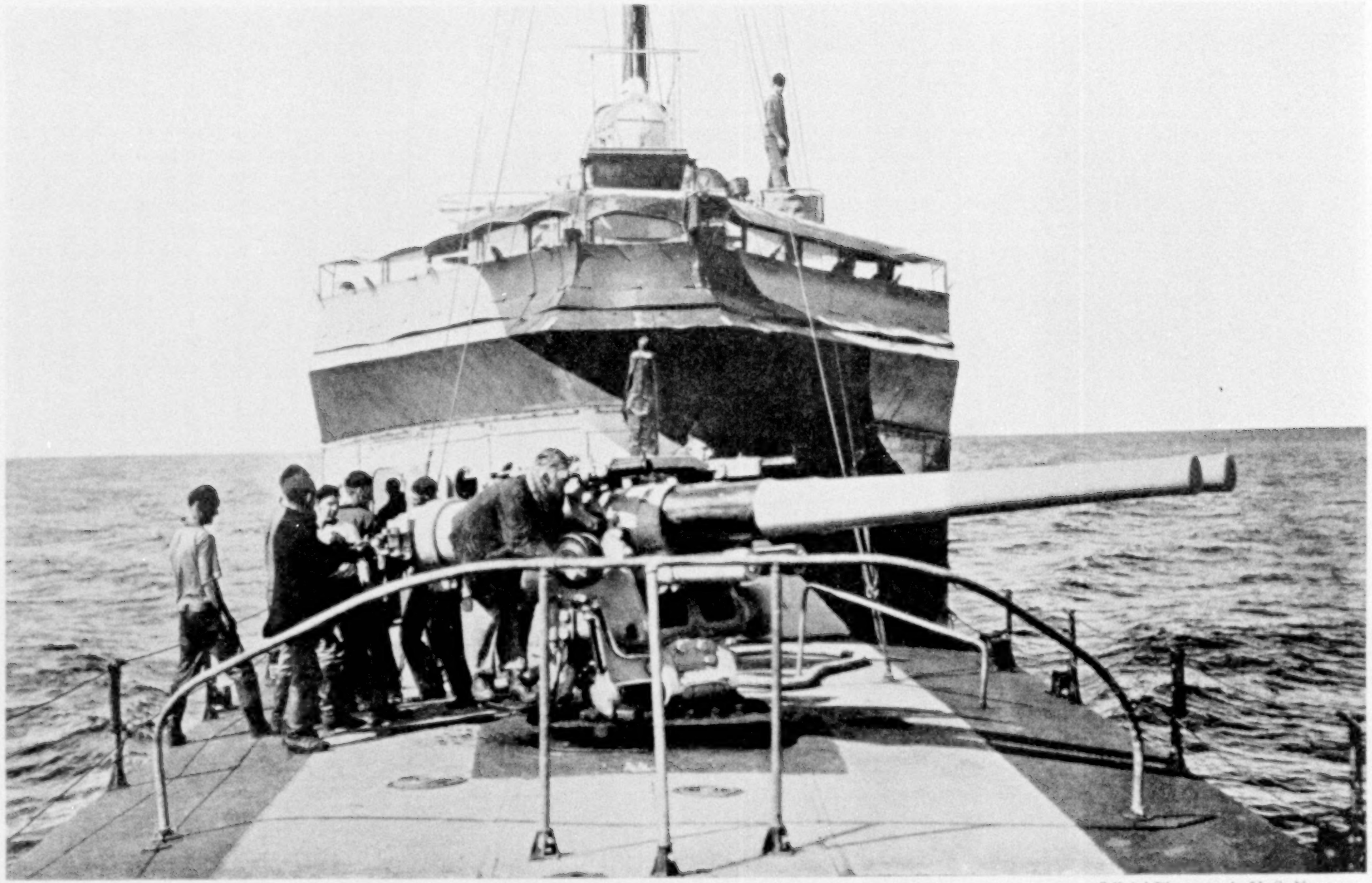
Down below, in the steaming fireroom, men splashed with fuel oil were fighting to get the life-giving oil to the boilers. The feeble light of the auxiliary lamps



Pacific and Atlantic Photos, Inc.

TRIPLETS OF DEFENSE

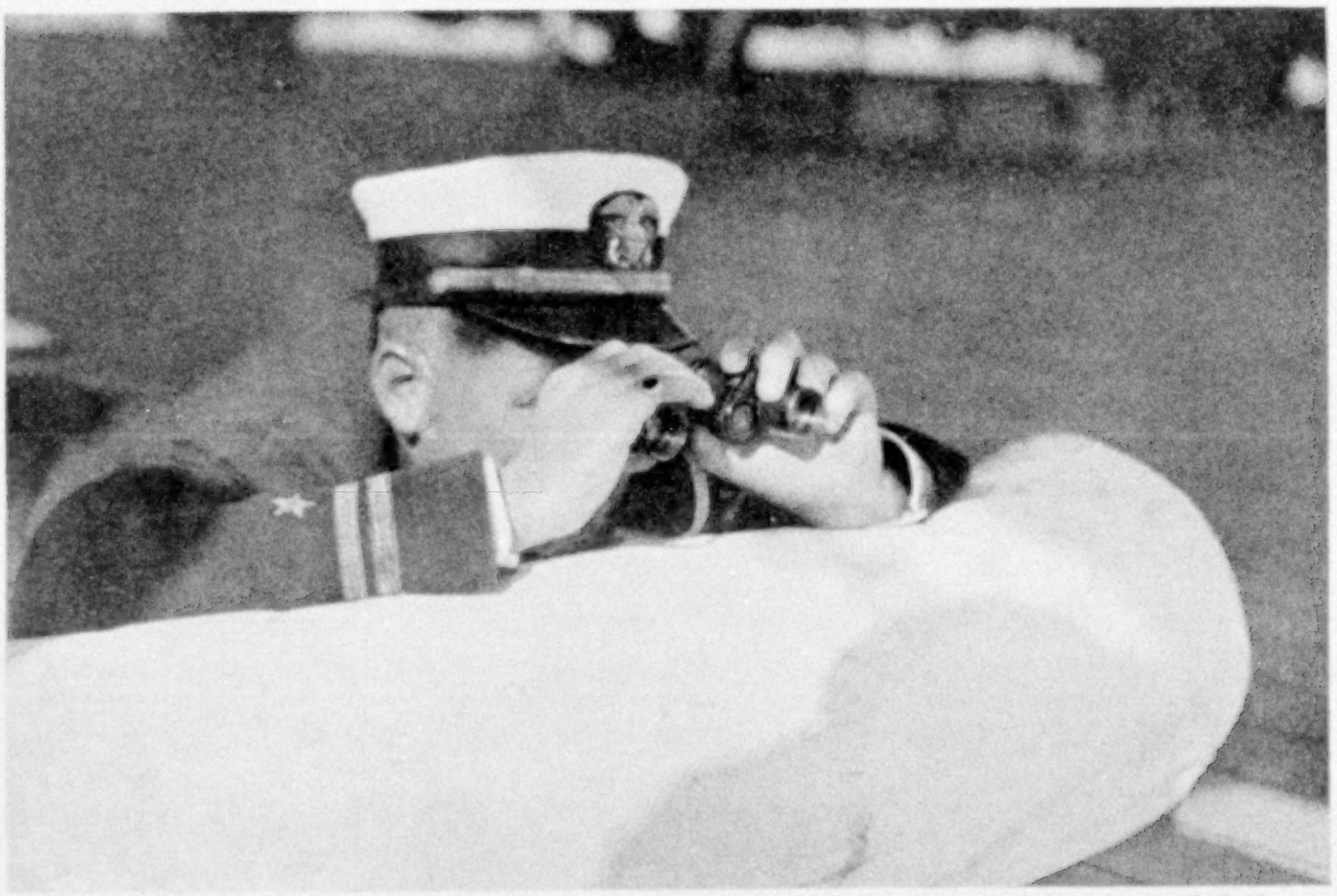
While a destroyer carries a few guns for use against submarines and other destroyers, her real batteries are her torpedo tubes. These most effective weapons send the "silver fish," as the torpedoes came to be known during the World War, off on their course of destruction against the great battleships (see, also, illustration, page 456, and text, page 467).



Official Photograph, U. S. Navy

GUN DRILL

This crew is engaged in sighting their "twin mount," as the pair of guns is known. The latest destroyers' batteries are equipped with a shield to protect the gunners from waves and spray (see illustration, page 412).



Official Photograph, U. S. Navy

SIGHTING DUMMY TARGETS (SEE ILLUSTRATION ON OPPOSITE PAGE)

This deck work constitutes an important part of the gunnery training of young officers. The officer looks through the reverse end of his binoculars to lend distance to the view of the targets.

cast ghostly shadows against the shining boiler fronts. Johnston, his hair caked, his eyes almost blinded by a faulty burner that had sprayed him with oil, hammered the gratings with a monkey wrench.

"Not a man of you leaves this fireroom—do you get me? We've got to pick up suction! Cut in all burners! Cut in all tanks! Let 'er go! Water or oil—something's got to start!"

As if his determination had struck fire from flint, a roar of flame rushed through the burners of both boiler furnaces. Oil was coming—oil mixed with water—for the roaring was punctuated with fizzes, and the white smoke from the mixed oil and water backed out from the boilers, gagging and choking the men frantically trying to manipulate the burners.

Suddenly, in the midst of this mêlée, the ship shook from end to end, straining at every rivet, quivering under a terrific shock.

"Hold it, boys!" Johnston yelled, white beneath the oil and grime on his face. "Never mind that! We'll get her yet!" The oil sputtered and fizzed, but the fires swept under and over the boiler tubes. Steam gauges began rushing up. Forced draft blowers commenced humming in a low, encouraging tone. As the steam gauges registered 150 pounds, the engine rooms cut in on the generators and the ship was once more aglow with light.

On the bridge the shock had turned our faces white under the cover of darkness. I had returned there, feeling a strange sense of unreality. The weird sensation of helplessness was increased by the black of the night, the screeching of the wind, the ghostly wash and spray of the waves, the incessant roll of the ship, the uncanny light of the Cape pointing its finger at us and then withdrawing it suddenly, leaving us to the mercy of the howling dark.

Suddenly the boilers were torching red flames high above the tops of the stacks—this due, as I learned afterward, to the sudden heat applied to the accumulated oil in the bottom of the furnaces. A moment later the ship was shaken from stem to stern, as the boilers started "panting."

Official Photograph, U. S. Navy

SPOTTING PRACTICE

Training in spotting the fall of shot is given officers through the medium of diminutive targets and splashes set up on deck at distances which through binoculars appear in proportion to the actual distances over the water when real targets replace the models.

"They've got suction!" yelled the Captain in my ear. "Page, ring up full speed ahead! When the engines have enough steam, they'll answer. Don't know whether we've hit or not, but we'll get out of here, *pronto!*"

Atkins shouted out of the darkness, "Can't find a thing wrong, sir! All compartments are tight!"

Almost simultaneously came Stearn, clambering up the bridge ladder. "Captain, we're draggin' again!" he cried. "We stopped for about five minutes, but the last sounding was eight fathoms. Puts us close to the bottom in this sea!"

All at once the lights came on.

"We're going ahead now, sir!" Johnston, wild of appearance, was on the bridge, reporting to the Captain.

"What? Good! Fine! Here, Hall!" Captain Welles rushed toward me. I was tingling with excitement. "See that those anchor chains are secured as tightly as they can be. I'm going to drag the anchors until we're in deeper water!"

WHAT CAUSED THE HEART-SICKENING SHOCK

I was on the forecastle in a moment. Afterward I wondered how I had ever been so slow getting there. Reilly, the faithful, was with me, and as we started to put double stoppers on the chain, he turned to me.

"Port chain's gone, Mr. Hall. Snapped her links just at the 45-fathom shot. She musta held—Stearn says we held until that big crash. By the great saints! That was what the crash was! Chain surged and cracked under the strain, and when she went, the whole ship jarred like she had hit the bottom!"

We worked on in silence for a moment, both thinking what might have happened if the port anchor hadn't held.

Official Photograph, U. S. Navy

FUELING AT SEA

The use of oil as a fuel for warships has greatly increased their cruising radius and hence their effectiveness. It is now possible to fuel a destroyer in mid-ocean by means of a hose connection between it and the fuel ship. To accomplish this transfer in rough water is no easy task and calls for consummate seamanship.

To the bridge I sang out, "All secure, sir!"

"Very well!" came back by megaphone. "Stand clear! We're going ahead!"

As the ship forged ahead, the starboard chain tautened, then surged. Slowly the ship dragged out to deeper water, where the lone remaining anchor was weighed and catted, and we picked our way carefully on past Buoy 2CB, and shortly after four bells rounded the Tail of the Shoe Buoy.

ANOTHER SHOCK AT THE RENDEZVOUS

Inside the Capes the haze was lighter. The anchor lights of our squadron and those of Squadron Fourteen danced dimly over in Lynnhaven Roads. It was but a matter of minutes before we were threading our way among our mates, signaling the flagship for instructions.

The reply came sharply by blinker:

"Anchor 300 yards bearing 90° from the S * * *. Fleet sails at 0200 (2 a. m.) to-morrow for Guantánamo. Commanding officer report aboard immediately."

Three hours, and we, worn and somewhat crippled after our 600-mile battle, were to sail for Cuba! Flooded peak tanks and the steering engine room to be pumped or bailed out, broken port lenses to be blanked off, bent stanchions rebraced, fresh water for the boilers to be made. And every man and officer on board had been under physical strain untold for the past 50-odd hours.

The Captain called a hurried conference of officers on the bridge; then went below to shift into clean uniform for his call on the Squadron Commander.

I went into the emergency cabin. Page was there, talking to Stearn. He turned to me as I entered.

WITH THE FLEET AGAIN AND OFF FOR CUBA

"Well, Hall! Destroyer life may be rough, but it's seldom dull, eh? Come on, let's get below and start cleaning up. Nice little nap, and then you and I will get 'er under way. Others'll be ready to drop in their tracks after making repairs. Oh,

sail ho, for Cuba—Cuba, *perla del mar!*"

At 2 we were under way. A handful of men and officers moved the K * * * into her position in column, and, with our bodies aching and eyes strained, we slipped along out the entrance to Chesapeake Bay.

Ships were proceeding out of harbor in a night sortie. A dimmed light on the vessel ahead was our only beacon of the fleet's existence. Ahead of us somewhere mine sweepers had cleared a narrow channel for our exit. Destroyers of Squadrons Nine and Fourteen followed out astern of submarines, and were followed in turn by the battleships and supply ships of the Scouting Fleet. The first series of tactics for the Southern cruise was on.

I was no longer acutely aware of the ship's lurching. Spray tossed in my face by the wind served to cool and soothe the wearied feeling which had crept over body and mind.

Official Photograph, U. S. Navy

A CLOSE-UP: OILING SHIP

Fuel oil has almost displaced coal in the Navy. Not only is it more efficient and much more easily handled, but it is so much cleaner than the "black diamonds" that fueling is no longer the fearsome and filthy process it once was (see, also, illustration, page 462).

Once outside the Capes, our division separated, taking up an assigned position in scouting line ahead of the main body of battleships and ships of the train. By 4 o'clock, when I stumbled below, the K * * * was steaming south at 15 knots on the rim of a huge circle, in advance of the fleet main body, which formed the center.

I was awakened before noon by the same talkative quartermaster who had hauled me from my bunk the first memorable night out of Boston. It seems to be a necessary qualification for a quartermaster—to talk sufficiently, perhaps to no point—until the oncoming watch officer is thoroughly on his feet.

"Only an hour or two from Hatteras, Mr. Hall!" This was what finally awakened me, for the reputation of the Stormy Cape put me on the alert. But what words were these? "Mr. Johnston says the weather's warmer and the sea is getting as flat as a looking-glass."

What, ho! Was Johnston "spoofing" me again, or was fortune about to change for us? After all the constant hammering we had received, could this be possible? Especially off Hatteras! I es-

Official Photograph, U. S. Navy

MAIL FROM HOME

sayed a puckering whistle, as I swung my feet over the edge of the bunk. By the time I was standing, the whistle had grown to full size and was varied by an attempt at song.

"Hey, Hall!" This roughly, across the passageway, from Atkins' room, which was dark, with curtains drawn. "Don't forget I had the four to eight and need my beauty sleep."

A CLEAR TICKET PAST HATTERAS

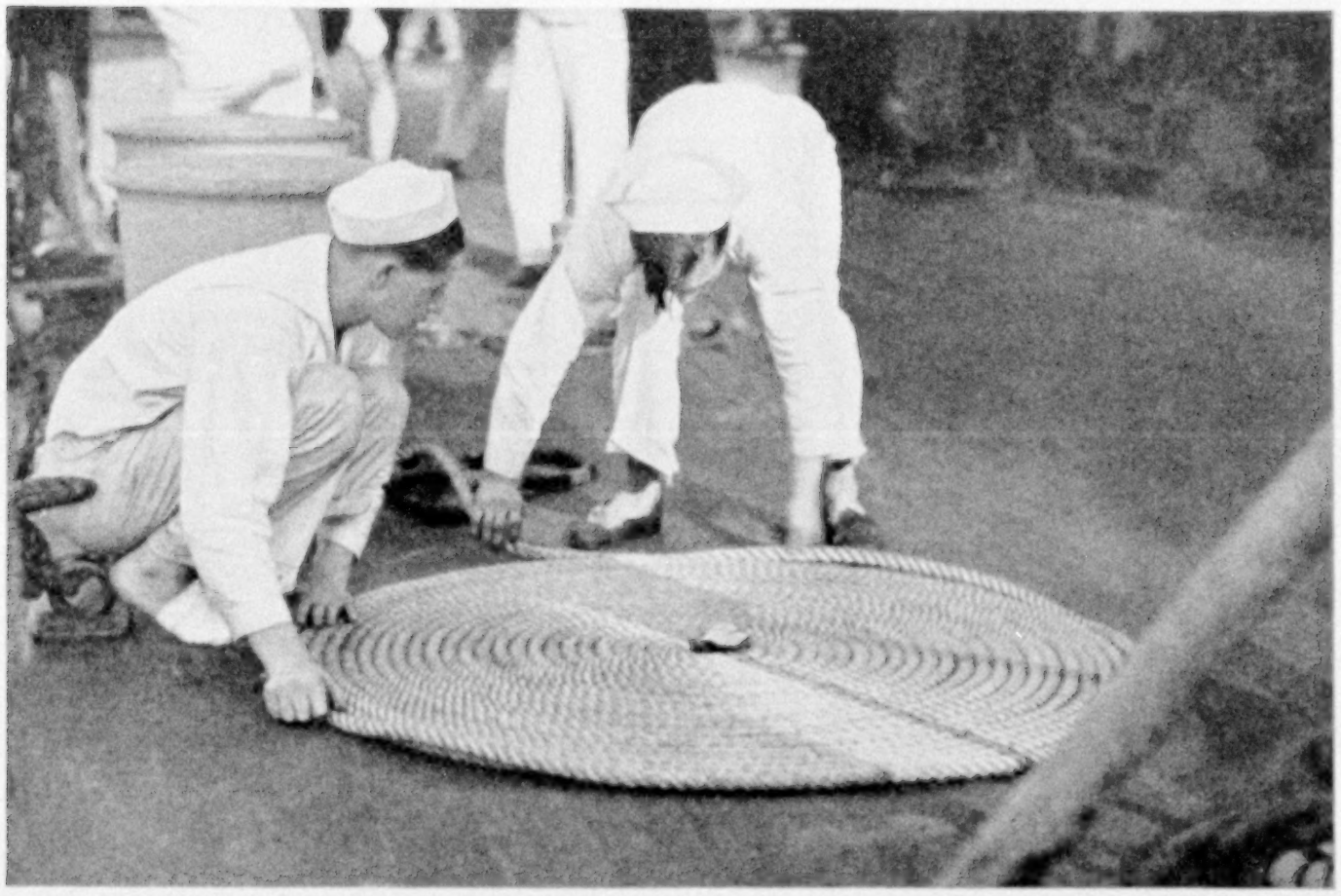
In spite of this reproach, my spirits would not down. At the wardroom table, which the carpenter's mate had miraculously contrived to bend and patch into some semblance of its former shape, I could scarcely refrain from humming. The spirit seemed to be spreading, too; for López, the Filipino mess attendant serving me, was actually "on deck," with his quiet smile, for the first time since we had left Boston Light Vessel.

When I went up on the bridge, Johnston greeted me with a wan smile. Poor devil looked to be all in—probably due to getting his repair work done before sailing. However, he was, as usual, in good humor.

"See what I've left for you!" He swung his arm around the horizon. "Nothing like it, old boy; this is the life! People pay good money for trips like this; and to think, in two more days we'll be in the sunny Caribbean!"

After taking over the watch, I looked out across the waters. The crow's nest of the S * * * was barely visible through binoculars, there, slightly abaft the port beam. That of the L * * *, as well as the tops of her stacks, I could see on the starboard beam without the aid of my glasses. Nothing else was visible from the ship but the rolling indigo blue below and a tufted blue sky, glarish in the midday sun, overhead. Astern of us some 12 miles, I knew, were the battleships, for we were dead ahead of them, on our part of their surrounding circular screen.

"Well, Hall, how does this strike you?" It was Page, yawning at the moment I turned to him and stretching his arms wide. "By George, this is great! Tomorrow we'll be through the Gulf Stream, and then we'll be changing into whites. What's that!" He pointed at the surface of the water on our starboard bow. "A



Official Photograph, U. S. Navy

GETTING THINGS SHIPSHAPE

So neat and orderly is everything aboard a warship that we have derived the term "shipshape" as a synonym for trim and spotless arrangement. Making the rope coil shown in the picture is known as "flemishing down the boat falls" and is peculiar to a man-of-war.

flying fish? Tell me, old man! Y'know, if it is, we can all have a bath to-day. It is! What? Never heard of that famous old tradition? Sure disaster to take a bath at sea down this way until you've seen a flying fish, I assure you!"

The crew on watch were smiling.

"Think I'll suit the action to the word, Hall. Give me a call about three, will you? Have to catch up sleep some time. Ever navigate any? Get you in practice checking my afternoon sun sight. Might get Stearn to oil up a sextant; but mind you"—this with stern burlesque—"don't take the nav-i-ga-tor's sextant by mistake!" (see page 441).

WE ARE ORDERED INTO ACTION

He started to go down the bridge ladder, but stopped when he saw a messenger running up with a radio blank in his hand.

"No sleep for me; I can see it coming! What is it, messenger?"

He took the outstretched message, scanning it. "Squadron Commander has ordered squadron to assemble on him, Hall. Smoke-screen attack on the battleships. Work's starting early this year." He handed the slip of paper to me. I verified the details of the message and sent it on to the Captain.

In a moment after the Captain's arrival on the bridge we had increased speed and changed course to intercept the S * * *. There was an air of eager anticipation evident, not only on the bridge, but also about the decks.

Snatches of excited conversation drifted up from the crew engaged in clamping down the decks and from the men scrubbing paintwork. Not all of the attempts to get the K * * * looking shipshape after her strenuous trip could down the man-o'-war's-man scent of a coming engagement with "the enemy."

SETTLING DOWN TO THE WORK OF THE CRUISE

It was not long before the squadron was formed. The ships farthest away had lighted off extra boilers, and now came up with roaring blowers, slicing the Atlantic clean with their sharp bows and

Pacific and Atlantic Photos, Inc.

SCRAMBLED SIGNALS

One might reasonably wonder what kind of a signal required such a jumble of flags, but all it really denotes is that the flags got wet, for the bluejackets are hanging them up to dry. This is known as "airing the bunting."

leaving it foaming white astern from racing propellers. A flag hoist from the S * * *, and the ships slid like well-drilled troops into a boxlike formation, with one side open. Circling and maintaining the same relative position in formation, the squadron changed course and sped at 20 knots toward the approaching battleships.

Gongs for general quarters began sounding throughout the squadron. Decks were alive with men donning gas masks. Guns and torpedo tubes were manned, engine rooms and firerooms were being manned to battle complement.

Signal flags raced to the yardarm of the flagship.

"Van divisions, make smoke screen."

As the order was executed, heavy, black billows began rolling from the stacks of our two van divisions nearest the path of the approaching battleships.

"Good screen, Page," Captain Welles remarked, as he put on his gas mask. We were engulfed in the smoke of the ships ahead of us. The gas masks we were wearing for protection against an expected aërial gas attack afforded us relief from the gagging smoke clouds.

A messenger, who had been standing with his ear glued to the voice tube from the radio room, suddenly dashed past me. He touched the Captain's arm and made an emphatic gesture. The radio signal to execute the torpedo attack had come!

The Captain motioned the quartermaster at the wheel to give hard left rudder, and himself rang up full speed ahead to the engine rooms. In a second we were clear of the smoke screen with our mates of the attack division, dashing in column and baring our teeth to the line of battleships, there on our starboard bow, distant 8,000 yards.

Our leader dipped a signal flag. Instantly the division "fired" its broadside. I could almost see the wakes of 36 torpedoes slipping at high speed toward the targets. As airplanes from the fleet swooped at us, the division turned sharply around. The leader's flag again dipped, our other broadside was "fired," and we darted back into the smoke screen.

Official Photograph, U. S. Navy

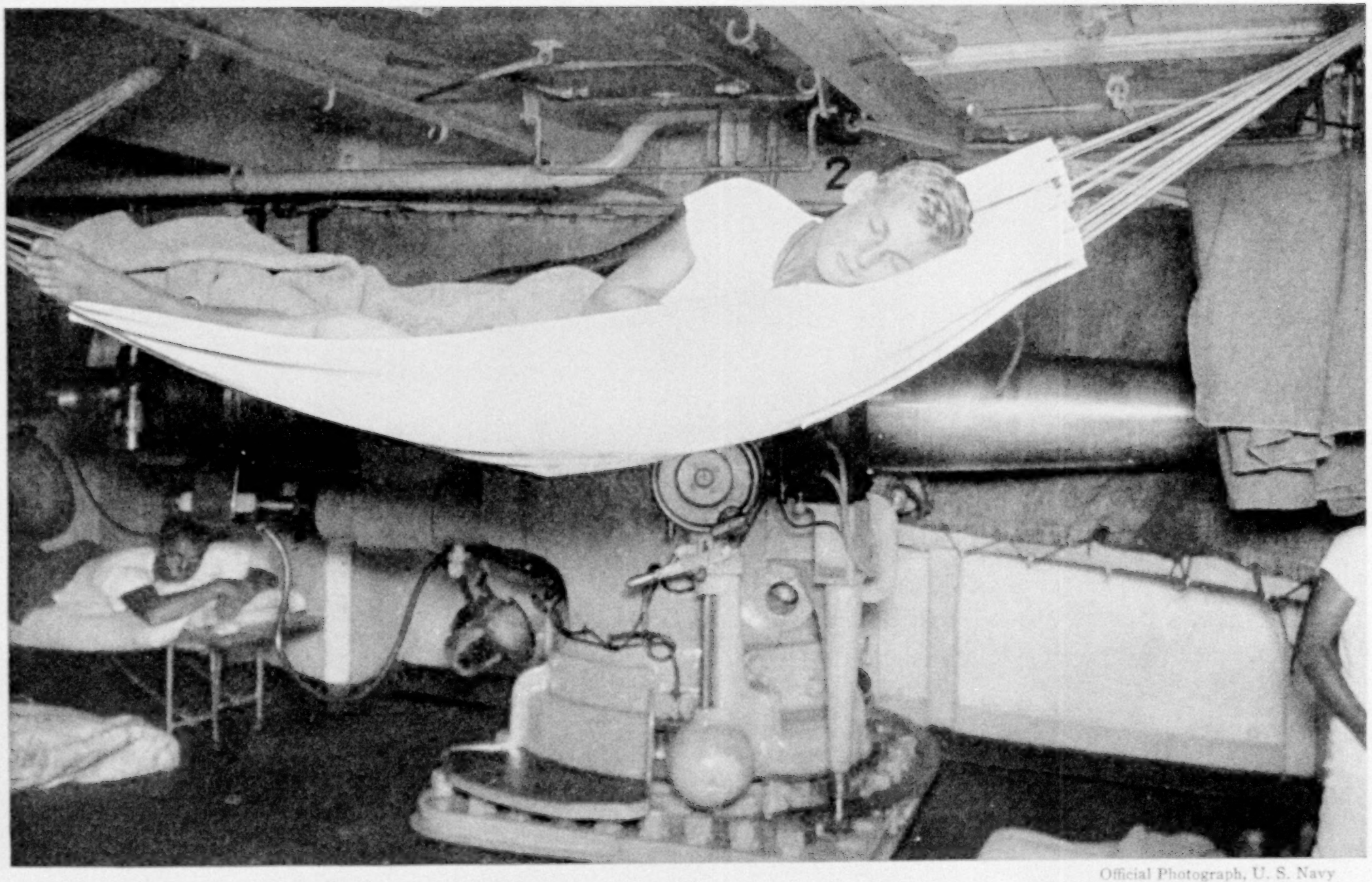
VISIBLE RADIO

Despite the introduction of radio for Naval communication, the semaphore signal is still an important agency for the transmission of messages between ships within easy "eye-range." The quartermaster in the picture is sending the letter "J."

Official Photograph, U. S. Navy

WASHING DOWN DECKS, A DUTY WHICH THE SAILOR HAS FACETIOUSLY DUBBED "FIELD DAY"

XUM



Official Photograph, U. S. Navy

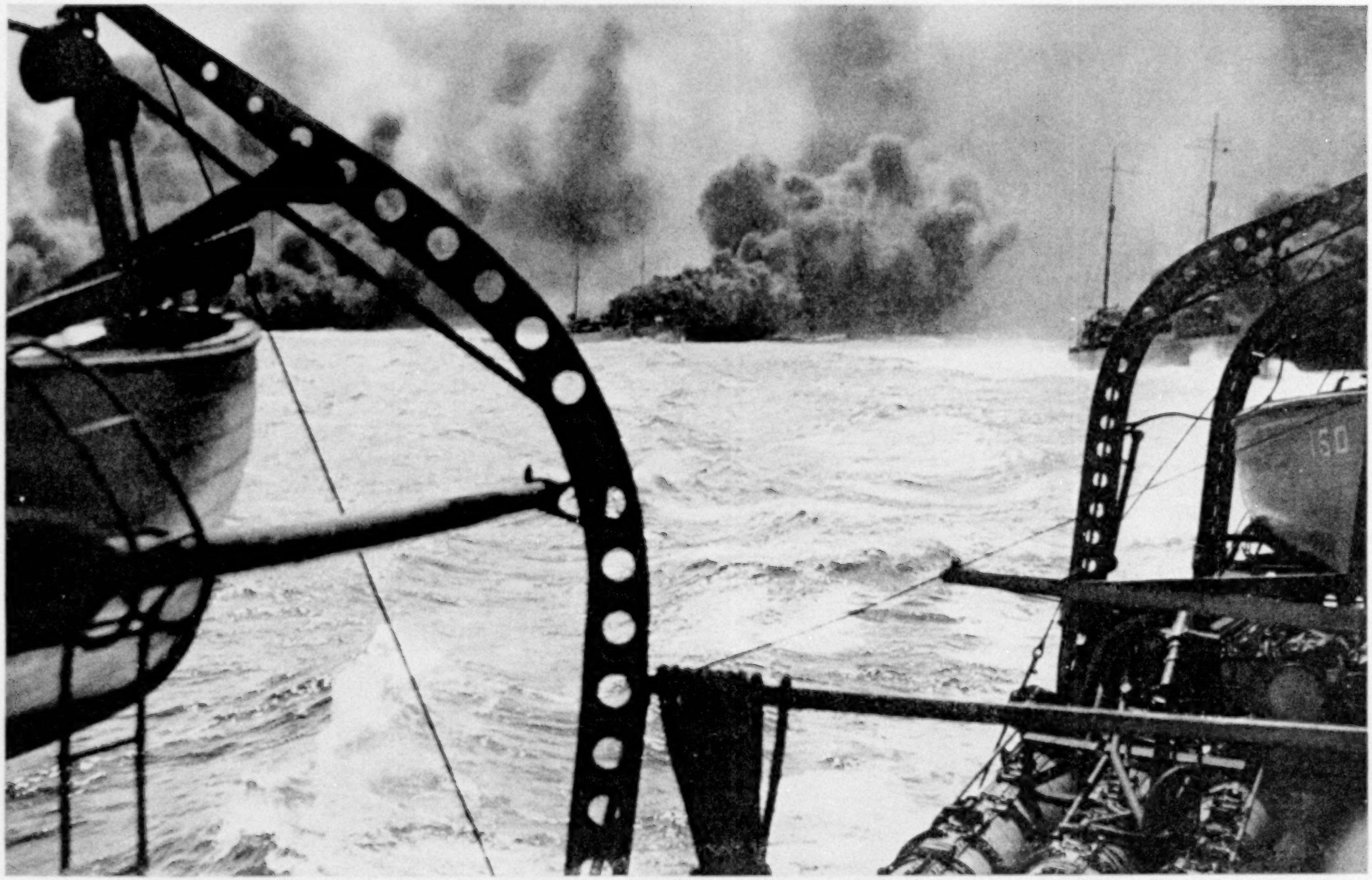
ROCKED IN A HAMMOCK ON THE DEEP

Sleeping quarters for the men on a battleship are very much "à la sardine," because a small space must accommodate many men. Hammocks are swung only about 18 inches apart, and their principal value is that, no matter how badly the ship may roll, the hammocks remain "on an even keel."

Official Photograph, U. S. Navy

CIRCLING INTO LINE WITH NAVY SCOUT PLANES OVERHEAD

"Circling and maintaining the same relative position in formation, the squadron changed course and sped at 20 knots toward the approaching battleships" (see text, page 467).



Official Photograph, U. S. Navy

DESTROYERS MANEUVERING BEHIND A SMOKE SCREEN

As an order to make a smoke screen is executed, heavy black billows begin rolling from the stacks of the destroyers nearest the path of the battleships they are attacking. This enables the other members of the squadron to maneuver for position out of sight of the enemy (see text, page 467).

Official Photograph, U. S. Navy

THE "CORRECTION"

The origin of the destroyer dates back to the time of the Russo-Japanese War. The successes of torpedo boats in that conflict led Naval architects to devise a torpedo-boat destroyer in much the same way that the student in Hugo's "Les Miserables" said: "The Bon Dieu made a mouse. 'Hullo,' he said, 'I've made a mistake?' So he made a cat to correct it."

"Cease present exercises," came by radio from the Fleet Commander, and, as the squadron ceased smoke and assembled on the S * * *, a "Squadron Nine, Well Done," was seen flying at the yardarm of the fleet flagship.

"Old boy's not only generous, but also irreproachably fair," chuckled the Exec.

"Well done" had been passed down on deck by the Captain, and as the ship "secured" from general quarters, a lighter spirit was evident. Atkins and Johnston, who had joined us on the bridge, noticed this, too. All of us, in fact, were feeling the wholesome effect of that signal. The Captain, actually grinning, stopped in front of us.

"Well, boys, after collarin' Cape Cod, I didn't feel as though we had done so well. But," and he looked behind at the vanishing flagship of the fleet, "we'll make a good ship of her yet!"

Notice of change of address of your GEOGRAPHIC MAGAZINE *should be received in the office of the National Geographic Society by the first of the month to affect the following month's issue. For instance, if you desire the address changed for your December number, the Society should be notified of your new address not later than November first.*

Photograph by Maynard Owen Williams

LIFE AT BATTLE HARBOR, PORT OF CALL ON THE LABRADOR COAST FOR THE RETURNING MACMILLAN ARCTIC EXPEDITION

MacMILLAN IN THE FIELD

Commander Donald B. MacMillan is now engaged in preparing his complete report of the work of the MacMillan Arctic Expedition, under the auspices of the National Geographic Society, with the coöperation of the U. S. Navy. It will be published in an early number of the NATIONAL GEOGRAPHIC MAGAZINE *and will be illustrated with photographs made by The Society's staff photographers who were members of the Expedition. With this number a large new map of the Arctic Regions, in six colors, will be issued as a special supplement.*

THE safe return of the MacMillan Arctic Expedition will be a source of gratification to every member of the National Geographic Society who has followed the day-by-day news, received by radio, of the work of exploration and scientific research which has been carried on during the summer under the auspices of The Society.

The achievement of the United States Navy flyers in the face of seemingly insuperable obstacles is in itself an epic of Arctic aviation. Lieutenant Commander Byrd, at the request of The Society, has given a bare outline of the work which he and the members of his command in the air have accomplished, but behind each sentence of that unembroidered, matter-of-fact account lies a story of initiative, skill, and daring worthy of the best traditions of the service to which these pioneers in Arctic flying overland belong.

An unprecedentedly severe season on this side of the Pole, with almost continuous fogs and snowstorms, and with an unexpected assault by icebergs on the anchored amphibian planes in the ordinarily safe harbor of Etah, has prevented the fulfillment of the expedition's plans to establish bases on the edge of the Polar Sea, from which the great "blind spot" on the map, aggregating an area of some million square miles, might be explored. Much has been accomplished for science,

Photograph by Maynard Owen Williams

THE MASTS OF THE "BOWDOIN" SILHOUETTED AGAINST A HIGH PROMONTORY AT BATTLE HARBOR, LABRADOR

however, and it is believed that the knowledge and experience gained by the Navy airmen will fortify the succeeding expeditions with data which will result in the eventual elimination from all maps the word "UNEXPLORED" which now disfigures for eager, acquisitive man that large region lying between Alaska and the North Pole.

PLANES FLEW MORE THAN 6,000 MILES WITH ONLY ONE FORCED LANDING

Commander Byrd's statement, transmitted by radio to The Society, is as follows:

"My records show that the planes have a total of 75 hours and 50 minutes flying time, which at 80 miles per hour equals 6,066 total miles flown—by NA-1 away from Etah, 2,506 miles; by NA-3, 1,713 miles; by NA-2, 1,073 miles.

"Total miles flown away from Etah by three planes on work accomplished for flight mission, 5,286 miles.

"Only one forced landing occurred on these flights. The NA-3 was forced down on the way to Igloo Dahouny, a half mile from Etah harbor.

"Approximately 30,000 square miles were seen from the planes on these flights. Of course, many of the flights were made over the same course south and southeast of Bay Fiord, extending for 70 miles.

"There are mountain ranges and mountain peaks, some of which reach an altitude of at least 7,500 feet and mostly covered with snow, except for a few comparatively low ranges near Bay Fiord.

"These mountain ranges do not show on any charts which I have seen. Mountain ranges lie nearly all of the way from Sawyer Bay to Cannon Fiord, and it is thought that most of this region is unexplored by white men.

"There is a lake about two miles long frozen over in the mountains between Sawyer Bay and Cannon Fiord about 20 miles from the northwest end of Sawyer Bay.

"The Greenland ice-cap reaches an altitude of at least 10,000 feet in a direction 100 degrees from Robertson Bay.

"It is thought that little has been known heretofore of ice conditions around Ellesmere Island in the summer period. Nearly all of the many fiords seen by us show them to be filled with ice which occasionally opens up, but soon closes in again. Bay Fiord and Eureka Sound east of Axel Heiberg Island are filled with drifting ice. The land in Ellesmere Island is firm, but too rugged to afford a landing place.

"In all territory flown over the Greenland ice-cap a comparatively warm stratum of air was experienced at 7,000 feet, and a bitterly cold one at 11,000 feet."

While the Navy flyers and MacMillan were making airplane history in the Arctic, other members of the expedition were engaged in transcribing in a series of remarkable color photographs the tints and hues of the Frozen North—north Greenland's surprising flower vales, the bizarre costumes of Eskimos, the animal, bird, and plant life that only the eyes of occasional explorers have ever beheld.

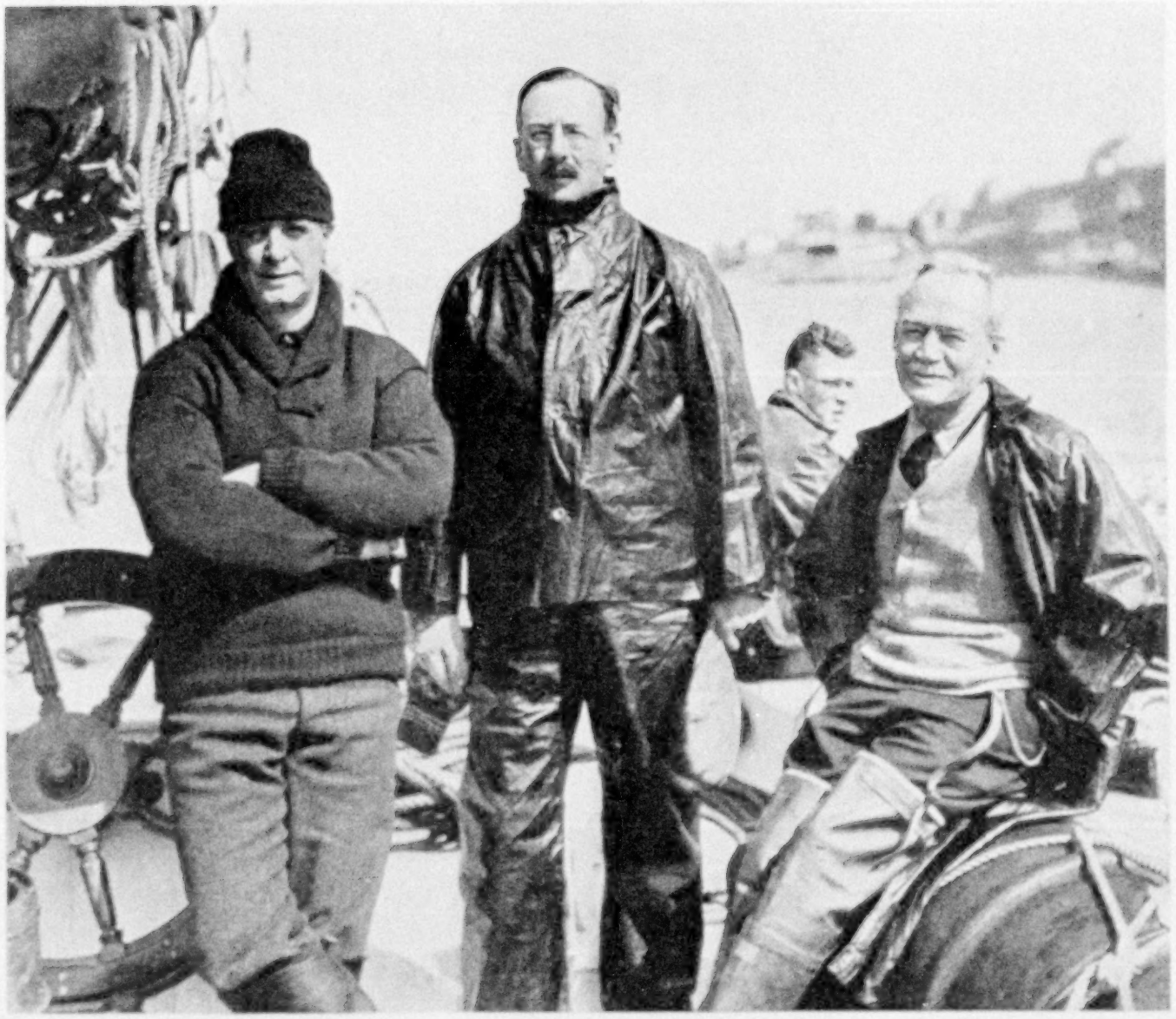
Dr. Walter N. Koelz, chief naturalist of the expedition, has collected data on fish life of the north and has studied and photographed winged snails, found floating through the waters of Etah harbor. He has also obtained the juvenile plumage of many birds that, while resident of the southern and central portions of North America during the winter months, breed within the Arctic Circle and are consequently little known. Specimens of bird species poorly represented in most of the museums of the United States, such as the Greenland Redpoll and the Purple Sandpiper, have also been collected.

Commander MacMillan, an authority on early Norse history, has pursued his studies of the Norse ruins in Greenland.

DAILY NEWS REPORTS GIVEN OUT BY THE SOCIETY

A unique feature of the MacMillan Arctic Expedition was the daily contact maintained with civilization by means of the short wave length or high frequency radio transmission, and an important aspect of the work was the coöperation throughout the United States of some 1,200 amateur radio operators of the American Radio Relay League.

From the Atlantic to the Pacific, and from the Gulf of Mexico to Canada, these radio amateurs, who accept no pay for their services, have worked long hours in the night receiving messages of many thousands of words, addressed to the National Geographic Society and the



Photograph by Maynard Owen Williams

ON BOARD THE FLAGSHIP "BOWDOIN"

Commander Donald B. MacMillan, leader of the MacMillan Arctic Expedition; Dr. Gilbert Grosvenor, President of the National Geographic Society, and Dr. Wilfred T. Grenfell, medical missionary. The photograph was taken at Battle Harbor, Labrador.

Navy Department, and given by them to the newspapers and press associations. Thus the news of the expedition forwarded by Commander MacMillan, Lieutenant Commander Byrd, and by The Society's representatives was published daily.

The wave lengths used by the Zenith equipment ranged from 16 to 40 meters. These are especially advantageous, because they can be employed in the daytime and the expedition was working in 24 hours of daylight, and also because extremely high power is not required for their sending.

So successful was the radio communication that the expedition was not out of touch with the National Geographic Society or the Navy Department for a single day during the entire summer. Messages were picked up all over the United States and also in England, Australia, New Zealand, and Canada.

Not until the complete report of Commander MacMillan is given to The Society for publication in the NATIONAL GEOGRAPHIC MAGAZINE, along with the pictures from the air and color photographs which give new impressions of the Far North, will the full results of the expedition be known and contributed to the world's knowledge. Preliminary reports, however, from the various members of the party show tangible results in the fields of topography, meteorology, zoölogy, ornithology, botany, and ichthyology which fully justified the labor, the hardships, and the sacrifices entailed.

Above all, the members of the National Geographic Society rejoice in the safe return of every member of the expedition.

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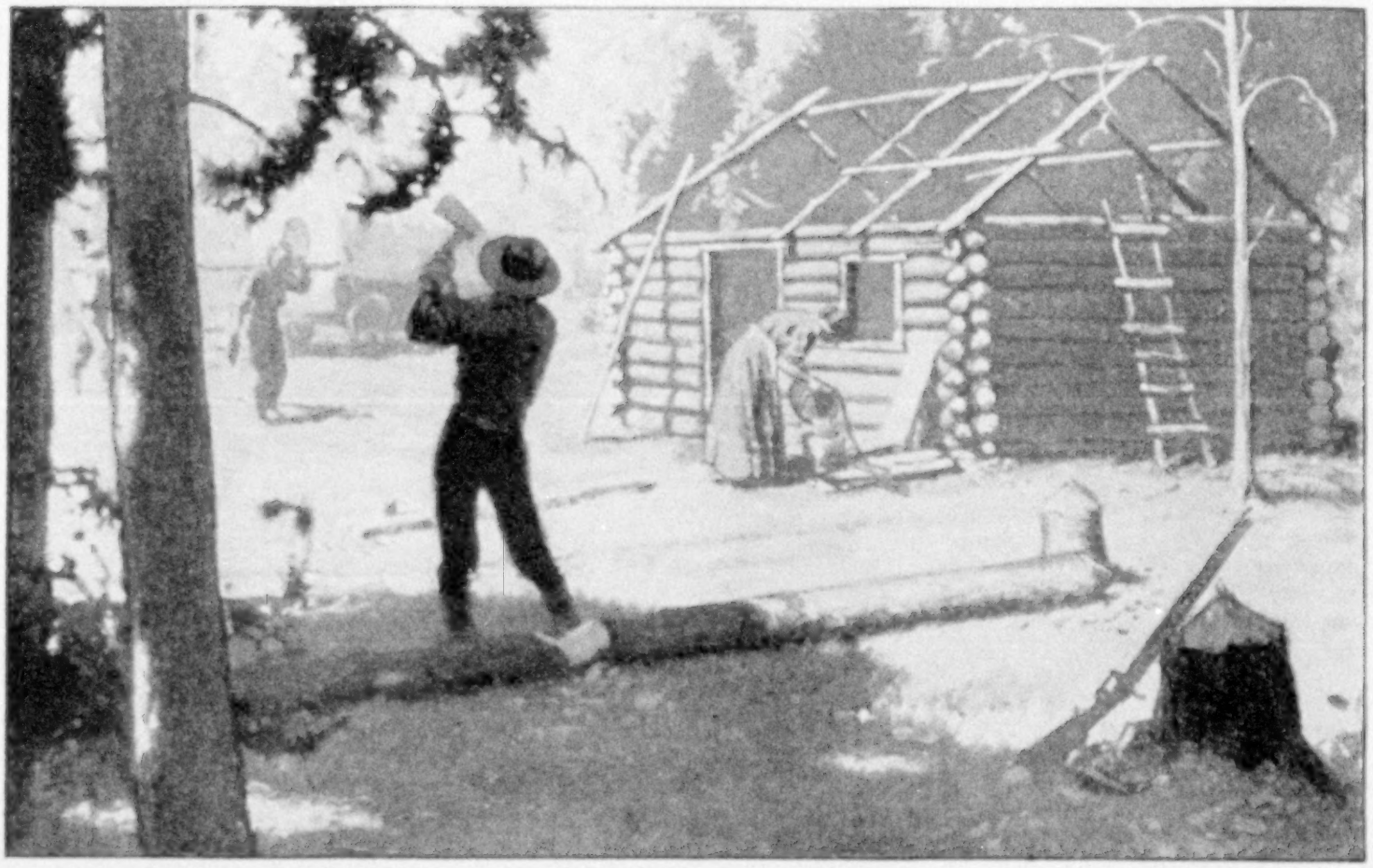

Building for America's growth

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In the midst of the development came the telephone. No one can tell how much of the marvelous later growth is due to it—how much it has helped the cities, farms and industries to build. We do know that the telephone became a part of the whole of American life and that it not only grew with the country, but contributed to the country's growth.

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Williams Doublecap is the name of the new Williams stick at the right. The covers of this stick are of equal size. One serves as the holder when the stick is in use. Because the holder is half the length of the stick itself, Doublecap gives you a generous, full-hand hold *on metal* that does not vary from the first to the last shave.

Below is Williams Holder Top, probably the best known shaving stick in the world. The soap is fastened securely in a metal ring which in turn screws into a metal holder.

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Ask your dealer to show you the two Williams sticks, Holder Top and Doublecap.

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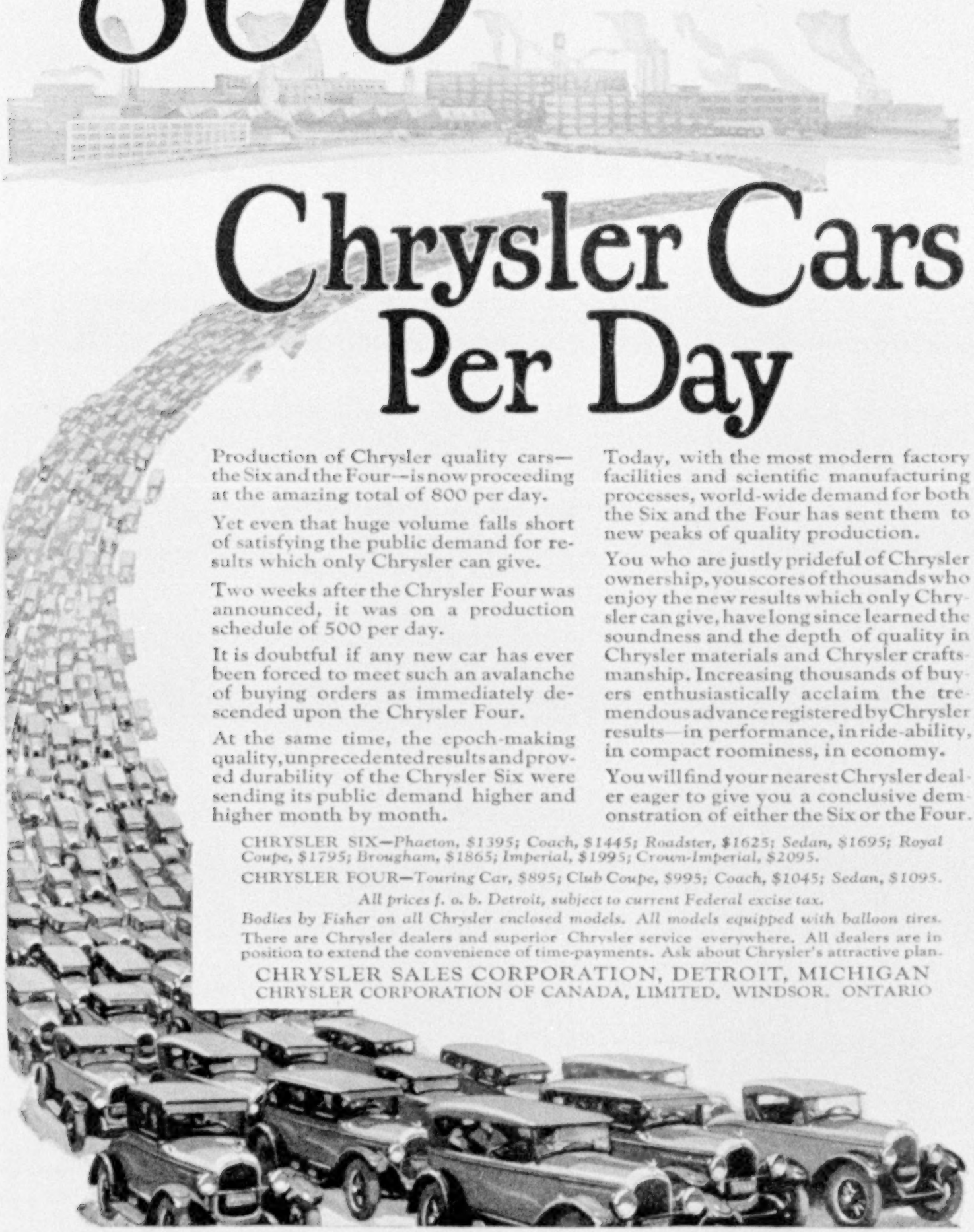

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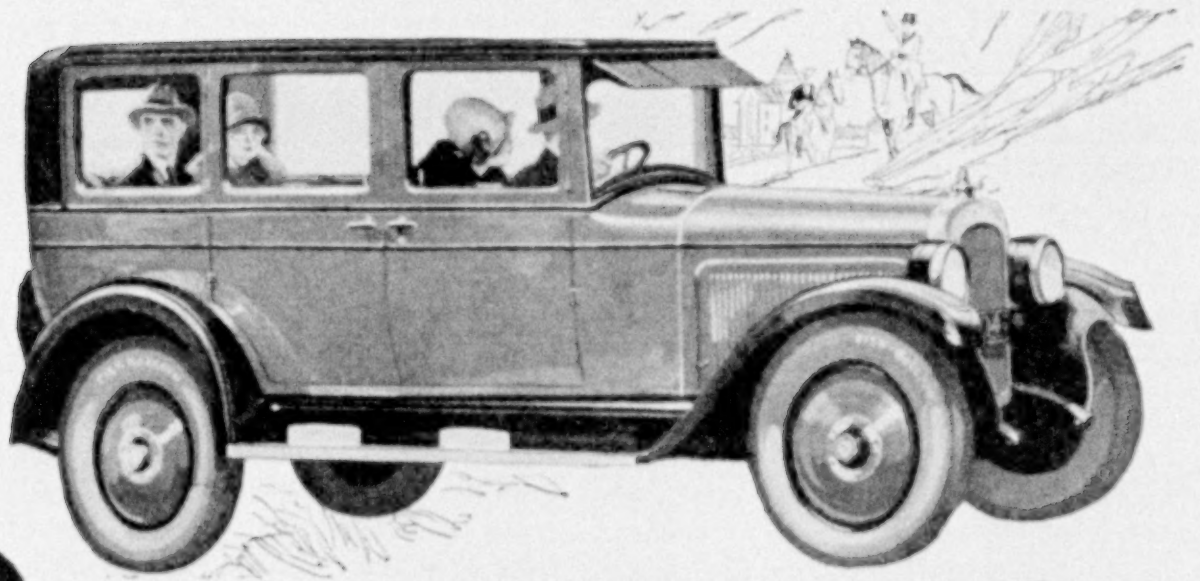

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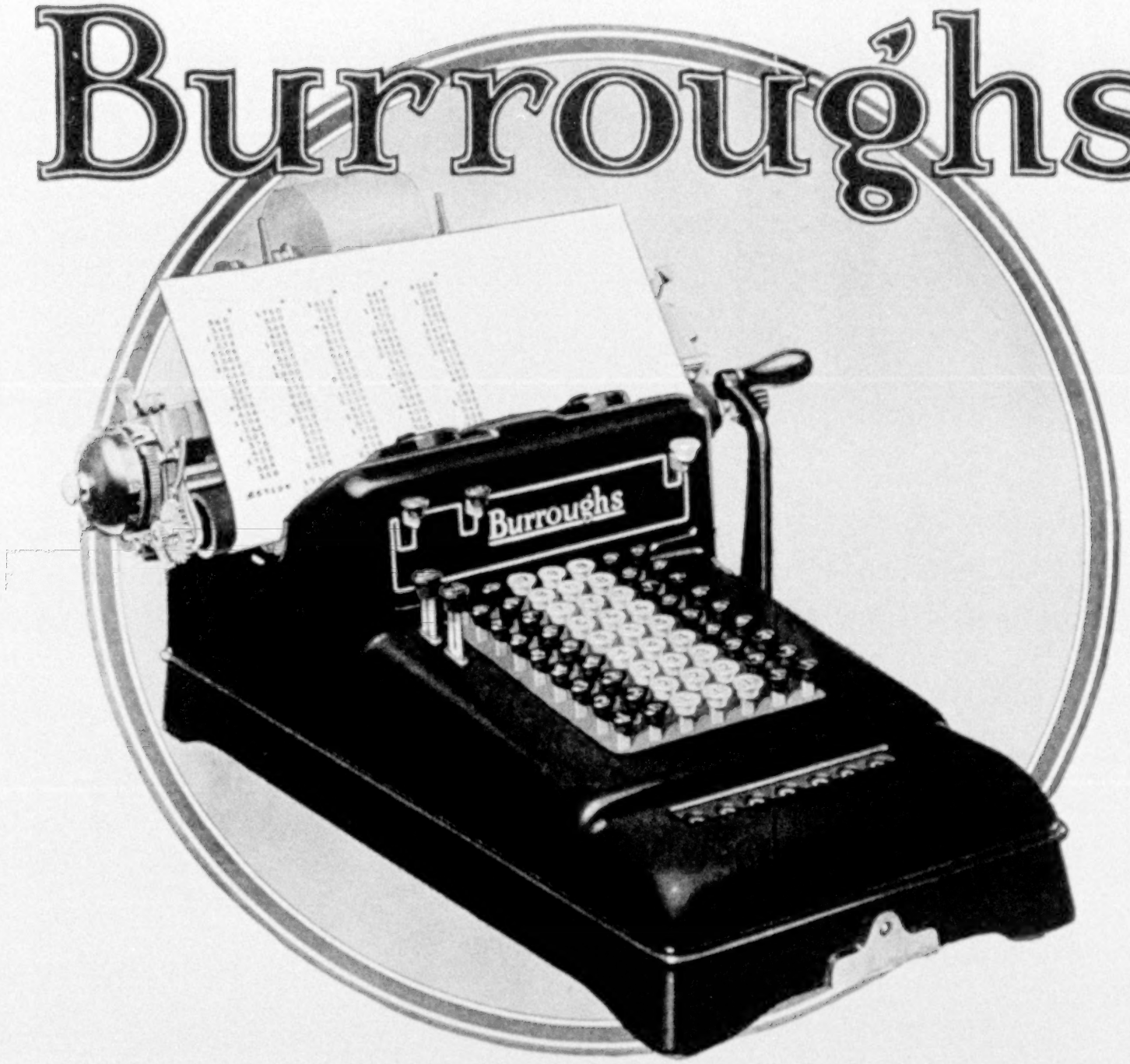

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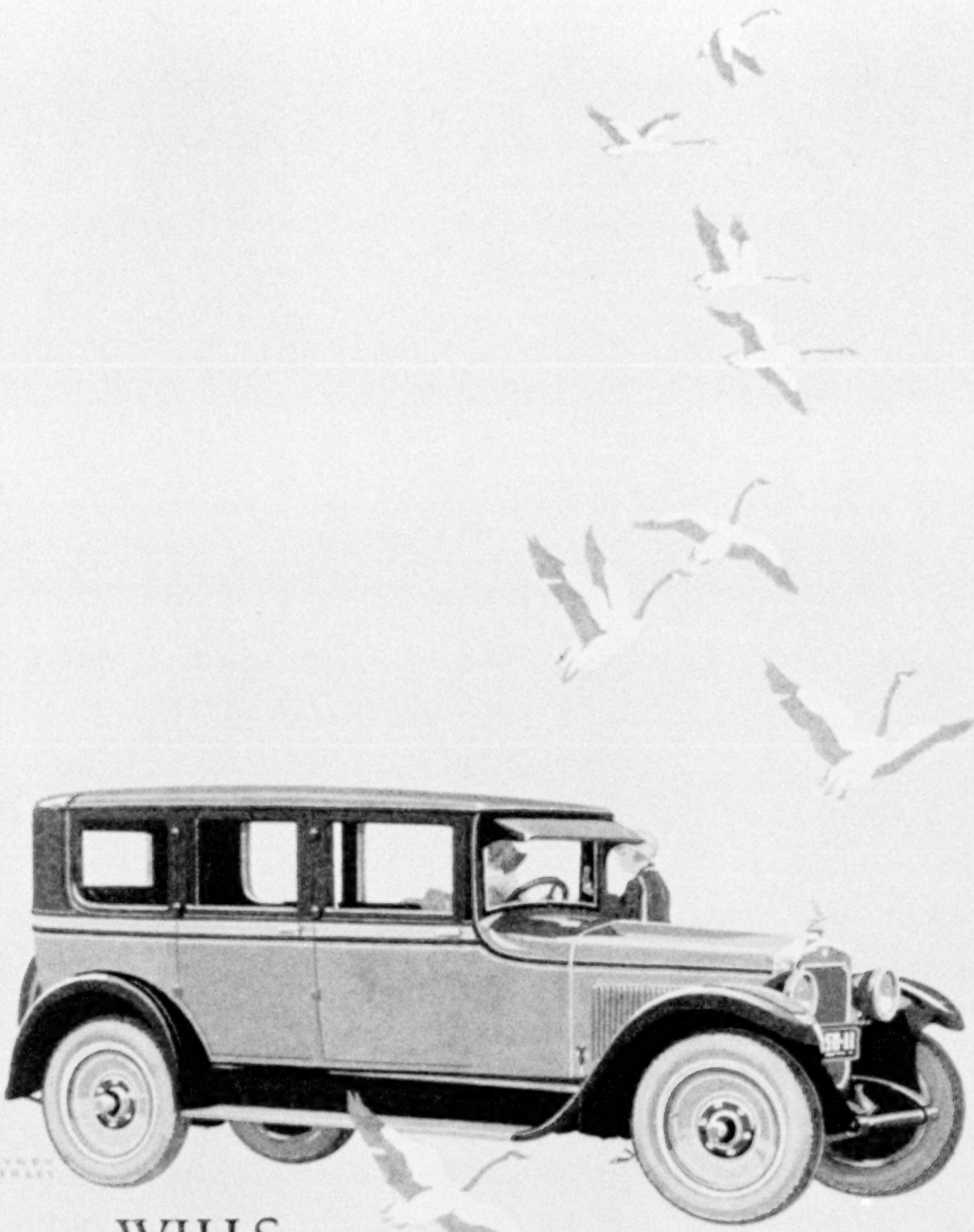

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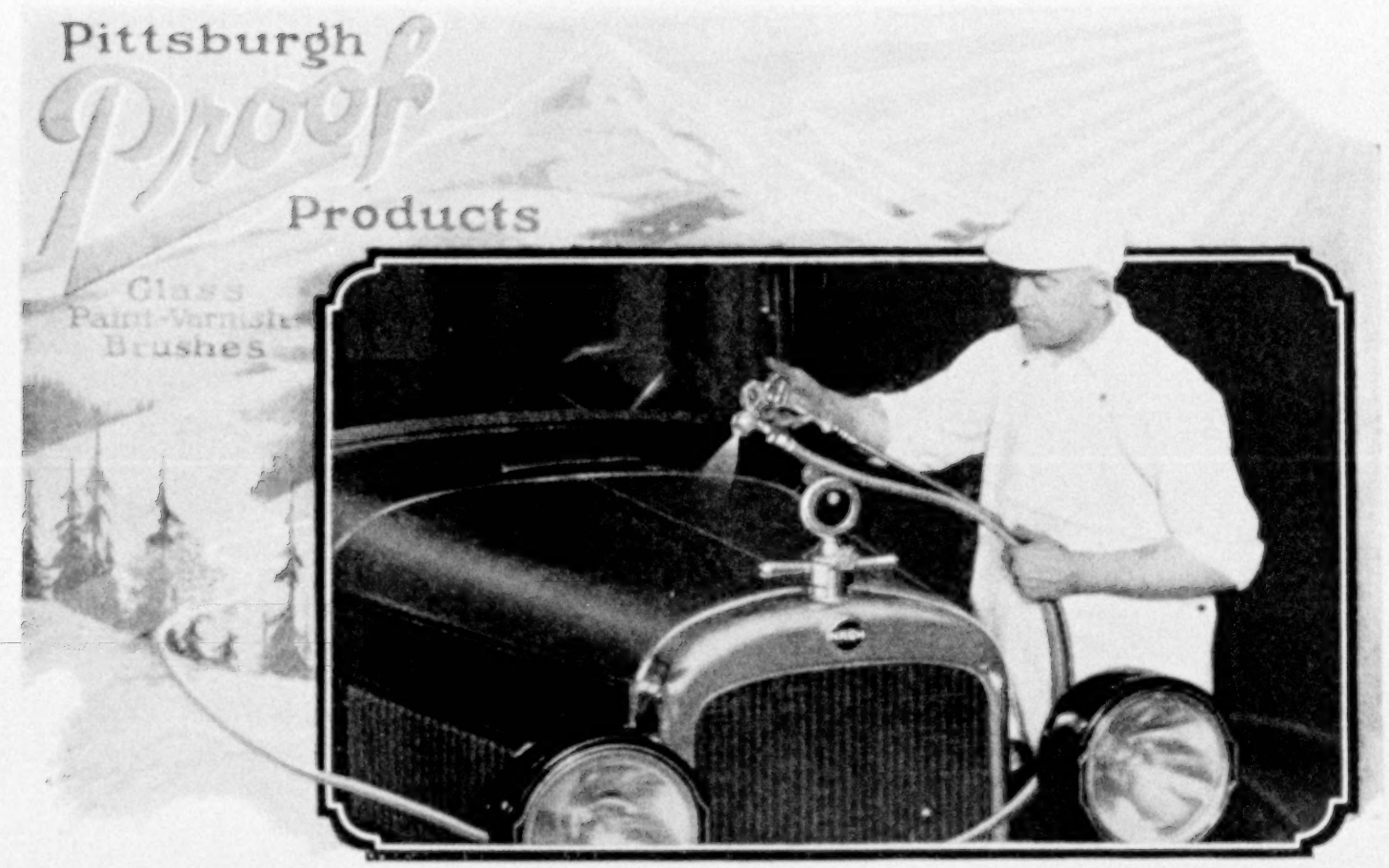
WILLS SAINTE CLAIRE, INC. . .
Marysville, Michigan



Mimax Automobile Finish

Like polished marble from everlasting hills

COMPARED with old standards of durability, MIMAX is as enduring as marble.

MIMAX, new type perfected finish, *takes an exquisite polish—a glowing, silken lustre, distinguished, distinctive, aristocratic!* Responsible refinishing shops have been licensed to use the MIMAX system and have been equipped under factory supervision!

Send back this coupon for estimate of cost booklet color card.

Research Laboratories
Dept. C.
Pittsburgh Plate Glass Co.
Milwaukee, Wis.

Please send me Mimax color card, booklet and approximate cost of refinishing my car by the Mimax system.

My Name .....

Address .....

City .....

PITTSBURGH PLATE GLASS CO.

Paint and Varnish Factories ..... Milwaukee, Wis., Newark, N.J., Portland, Ore., Los Angeles, Cal.

4 out of 5 are marked

There's no way to get around it. Dental statistics show that four out of every five over 40—and thousands younger, too—are victims of Pyorrhea. Do you want to avoid this dread disease?

Prevent tooth decay below the gum-line

As the soil nourishes the tree roots, the gums nourish the teeth. And as the tree decays if you bare the roots, so do the teeth decay when gum shrinkage starts in.

This condition—one of the first stages of Pyorrhea—is very common and something that ordinary tooth pastes are powerless to prevent. If not checked promptly, it will lead to loss of teeth and disease.

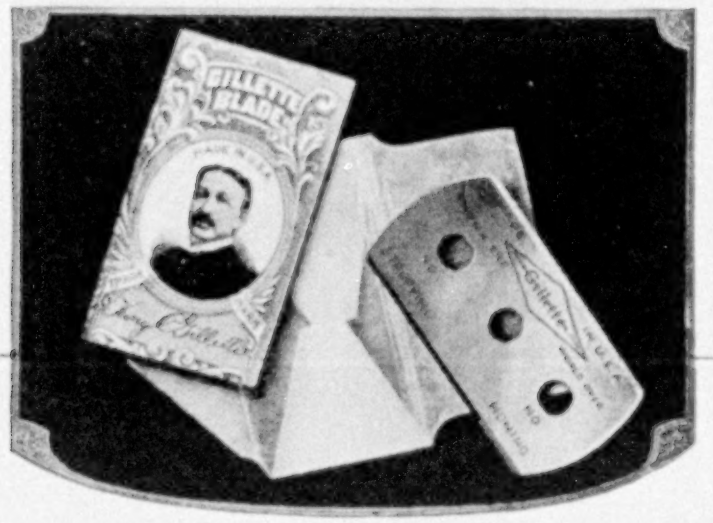
If used in time and used consistently twice daily, *Forhan's will help prevent Pyorrhea or check* its progress. It will preserve the gums in their pink, normal, healthy condition, safeguard your health and *keep* your mouth clean, fresh and wholesome.

Forhan's is more than a tooth paste; it helps to check Pyorrhea. Thousands have found it beneficial for years. For your own sake ask for Forhan's For the Gums. All druggists, 35c and 60c in tubes.

Formula of R. J. Forhan, D. D. S.
Forhan Company, New York

Forhan's
FOR THE GUMS

THE QUALITY RAZOR OF THE WORLD



ITS daily dividends in shaving comfort and a well-groomed look make your investment in Gillette Blades seem infinitely small by comparison. The shaving satisfaction these blades give in daily service is proof positive of their indispensable merits. The finest of blade steel and production processes perfected by the most thorough research and experiment, are, through the practical experience of twenty years of blade-making, responsible for giving the Gillette Blade *the finest edge that steel can take.*

GILLETTE SAFETY RAZOR CO., Boston, U. S. A.

The Gillette New Standard
In gold plate, $6.
In silver plate, $5.

Gillette
SAFETY Gillette RAZOR
BLADES

Whether you have a beard "like wire" or as soft as silk, your GOOD shave will become a PERFECT shave if you read "Three Reasons"—a new shaving booklet just published. A copy on request.

FACTS ABOUT A FAMOUS FAMILY

Testing cars to determine value at the General Motors' Proving Ground, near Detroit. The Proving Ground occupies 1125 acres.

Determining motor car value

General Motors has a car for every purse and purpose and seeks to give the utmost value in each price class.

On the roads of its great Proving Ground, cars are being driven day and night in tests involving speed, power, endurance, acceleration, fuel consumption, hill climbing, braking, riding qualities, etc.

From the facts observed, engineers are determining a standard of performance for each class and are passing on to the factories information which helps them to give *added* value for the price you are asked to pay.

GENERAL MOTORS

BUICK · CADILLAC · CHEVROLET · OAKLAND · OLDSMOBILE · GMC TRUCKS

General Motors cars and trucks may be purchased on the *GMAC* Payment Plan, which includes fire and theft insurance service.

DUPONT

DUCO

UNLIKE ANYTHING ELSE—
—IT IS DUCO, THE BEAUTIFUL, ENDURING FINISH

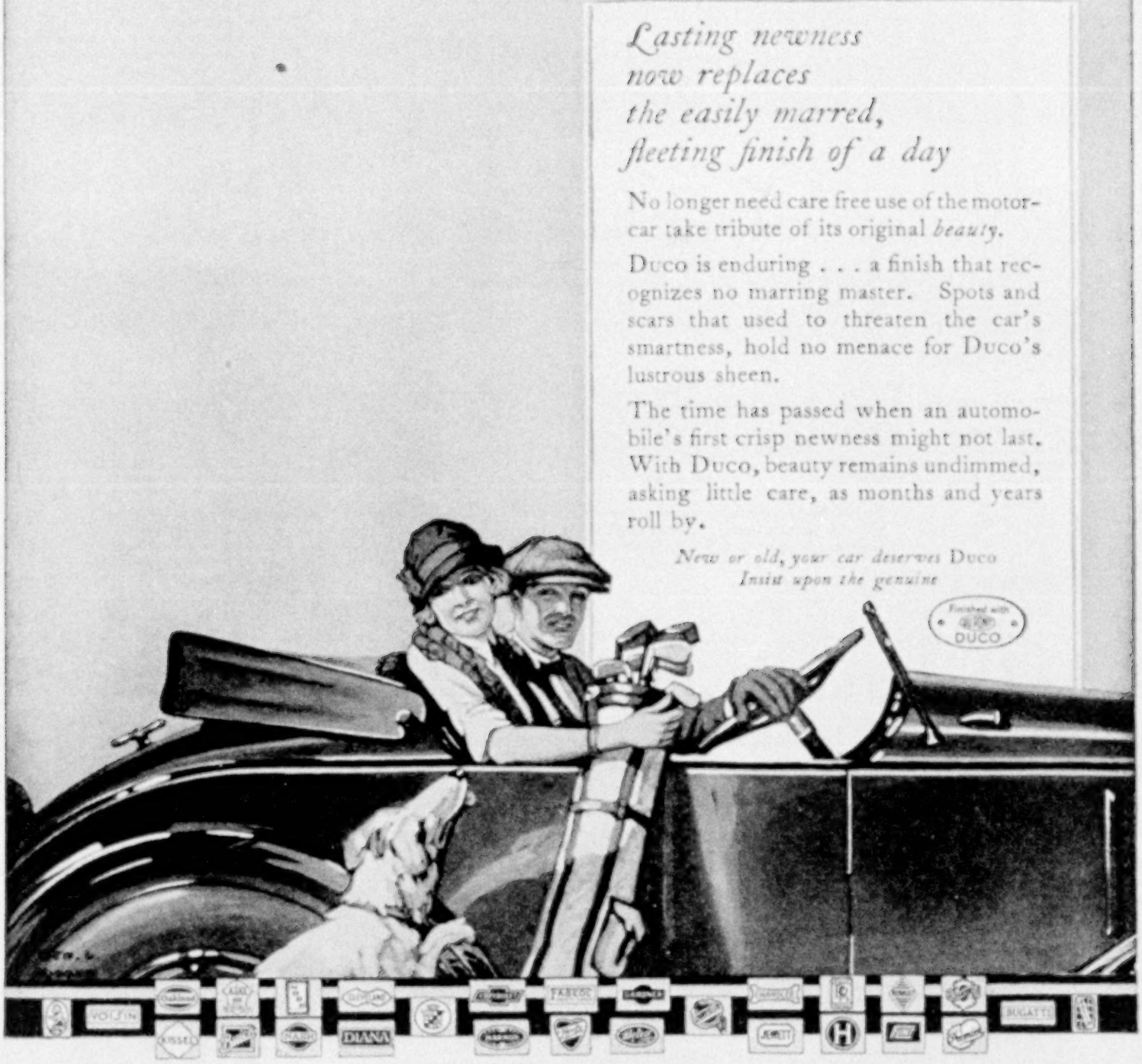
Lasting newness
now replaces
the easily marred,
fleeting finish of a day

No longer need care free use of the motor-car take tribute of its original *beauty*.

Duco is enduring . . . a finish that recognizes no marring master. Spots and scars that used to threaten the car's smartness, hold no menace for Duco's lustrous sheen.

The time has passed when an automobile's first crisp newness might not last. With Duco, beauty remains undimmed, asking little care, as months and years roll by.

New or old, your car deserves Duco
Insist upon the genuine



DU PONT

TO secure enduring beauty, be sure that the finish on your car is of genuine DUCO—created and made *only* by du Pont.

This finish is uninjured by sun, salt air, rain, sleet or snow. Oil and grease can be wiped away readily. It is hard to scratch but easy to keep spotless and bright. Even strong soaps do not harm DUCO. It resists abrasion; mud and dirt have no effect upon its beauty.

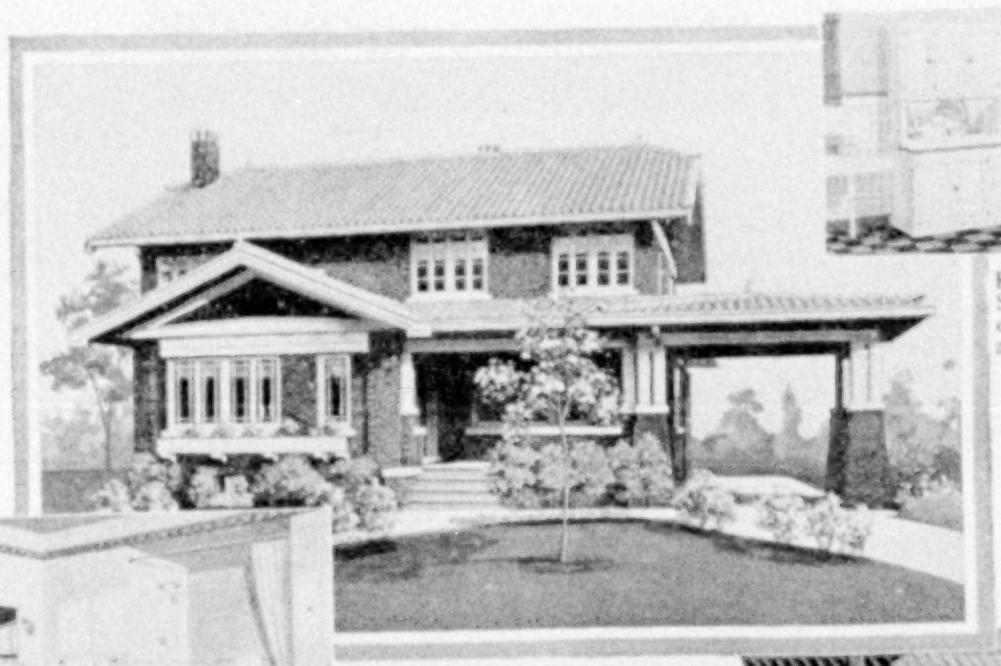
The trade-marks shown above testify to the widespread adoption of DUCO by automobile manufacturers whose names are synonymous with high ideals.

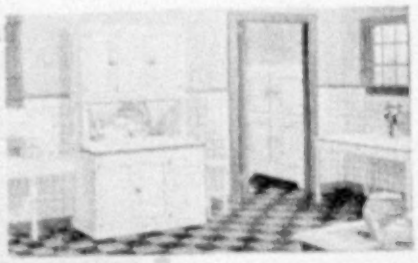
Old cars can also be given new beauty and increased in value.

Make certain that only genuine DUCO and du Pont undercoatings are used . . . your protection is the official sign displayed by Authorized DUCO Refinishing Stations throughout the country, one in every locality.

E. I. du Pont de Nemours & Co., Inc., Chemical Products Division, Parlin, N. J., Flint, Mich., Chicago, Ill., San Francisco, Cal., Everett, Mass., or Flint Paint & Varnish Limited, Toronto, Canada.

There is only ONE Duco — DU PONT Duco





Kitchen walls of Sheet Steel, painted or enameled, are easy to keep always immaculate and sanitary

Beauty and sanitary cleanliness are provided by bathroom walls of Sheet Steel, painted or enameled in white or delicate tints

Sheet Steel furniture has beauty that is permanent. Doors and drawers never warp, bind or stick

Rigid and durable walls and ceilings, with maximum fire protection and elimination of cracks in plaster, are insured by the use of metal lath made from Sheet Steel

The Finest Homes Are Using Sheet Steel *for* Construction, Equipment and Furnishing

From roof to basement, the modern home utilizes Sheet Steel for economy, efficiency and added comfort and convenience.

For construction, in the form of roofing, metal lath and walls of bathrooms and kitchens; for equipment, in warm air heating systems, clothes dryers and other modern appliances; for furnishing, in kitchen cabinets, refrigerators and furniture.

Sheet Steel roofing, in the form of the popular Spanish Mission tile, as used on the house illustrated above, combines architectural beauty with economical and enduring protection. Sheet Steel, in the modern warm air heating system, insures healthful warmth with fuel economy. And in furniture and furnishings, this same remarkable material sets new standards of beauty and service.

You will be interested in the illustrated booklet, "The Service of Sheet Steel To The Public." It will suggest to you many ways in which this material of universal adaptability can serve you. Write for it, free.

SHEET STEEL

TRADE EXTENSION COMMITTEE

OLIVER BUILDING

PITTSBURGH PENNSYLVANIA

Exceptional Riding Comfort

The riding comfort of a motor car is not dependent upon its length, weight or cost, any more than the comfort of a home depends upon its size.

If the seats are deep enough and the proper distance from the floor; if the seat backs are correctly pitched for relaxation; if the upholstery is sufficiently stuffed and there is plenty of leg room; above all, if the springs are rightly designed and of proper length, you will have exceptional riding comfort. Otherwise, you will not.

Dodge Brothers, with characteristic thoroughness, studied and experimented with these details for years. Their findings were ultimately incorporated in the design of Dodge Brothers Motor Car—without question now a vehicle that ranks with the first in this vitally important feature.

DODGE BROTHERS, INC. DETROIT

DODGE BROTHERS (CANADA) LIMITED
TORONTO, ONTARIO

"—by the judgment of this great tribunal of American people"—LINCOLN

IT was Lincoln's faith that the judgment of this tribunal is right. And so through the years it has proved to be—not only in the great matters of State, but in the thousand choices of daily life. Out of the multitude of things offered to them, the American people have given their marked preference to but a few—and to those few only because they *deserve* it.

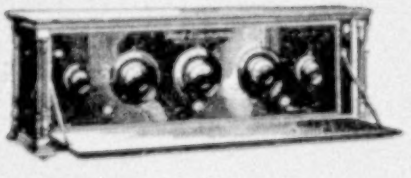
Last year, the American public made known its preference in Radio. The most striking feature of its choice is the *continued preference* given to *one* set—the FREED-EISEMANN. Although competing with thirteen other manufacturers of Neutrodyne Receivers, the volume of FREED-EISEMANN sales was more than half of *all* the others combined. Today, FREED-EISEMANN is by far the largest manufacturer of Neutrodyne sets in the world.

Trust FREED-EISEMANN *on* PERSONAL *Responsibility*

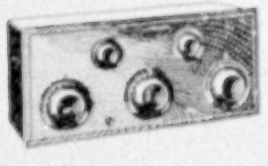
Mr. Joseph D. R. Freed, Mr. Alexander Eisemann and Mr. Arthur Freed, the executives of the Company, feel personally responsible to you for the performance of their radio set. They have inspired every man in their great plant with the same uncompromising vigilance; the same devotion to an ideal. You will know at the first turn of the dials, that your FREED-EISEMANN has been built by clever, trained, unhurried hands to give you pleasure—now and for years to come.

You can have a home demonstration without cost or obligation.
Telephone your FREED-EISEMANN *dealer today!*

Freed-Eisemann Radio Corporation
MANHATTAN BRIDGE PLAZA, BROOKLYN, N. Y.



The famous NR-20. A de luxe Neutrodyne* Receiver in a handsome mahogany cabinet. $175



FE-15—A new five-tube storage battery Receiver, licensed and manufactured under a group of the Latour patents and incorporating special engineering features . . . $75

*Licensed by Independent Radio Mfrs., Inc., under Hazeltine patents Nos. 1456080, 1489248, 1538855.

FREED-EISEMANN

Mastery in Radio

Mantel in dining room. Made of beautifully matched walnut. The whole room is paneled in Walnut in the Christopher Wren style. Epperson residence in Kansas City. Horace La Pierre, architect; woodwork by American Sash and Door Co.

Architects Find Inspiration in the Natural Beauties of

AMERICAN WALNUT

BETTER tendencies in home building and furnishing are reflected by the general return to the best classical styles. There is a harking back to the golden age of designing which finds expression in beautiful woodwork and furniture and the almost universal use of American Walnut.

This tendency is not limited to any section or class but is general throughout the country. Our architects and decorators are seeking their inspiration from the masters who created the finest styles we know. This beautiful mantelpiece of matched walnut panels is an adaptation of a Christopher Wren mantel in Lord Brownlow's mansion, Belton House. Wren brought interior decoration to its highest peak of dignity and refinement.

This dining room of a modern home is finished in walnut from which it gains its luxurious charm. The lovely grain, texture and color of the wood is used with rare skill to create an atmosphere of richness and dignified beauty.

American Walnut is not only inherently beautiful by virtue of exquisite patterns and designs, by natural color and ability to take and retain a fine finish, but it is proverbially strong and time-resisting. Everyday use does not lessen walnut's permanent beauty. Age only seems to mellow and enrich it.

"THE COOLIDGE CHAIR"

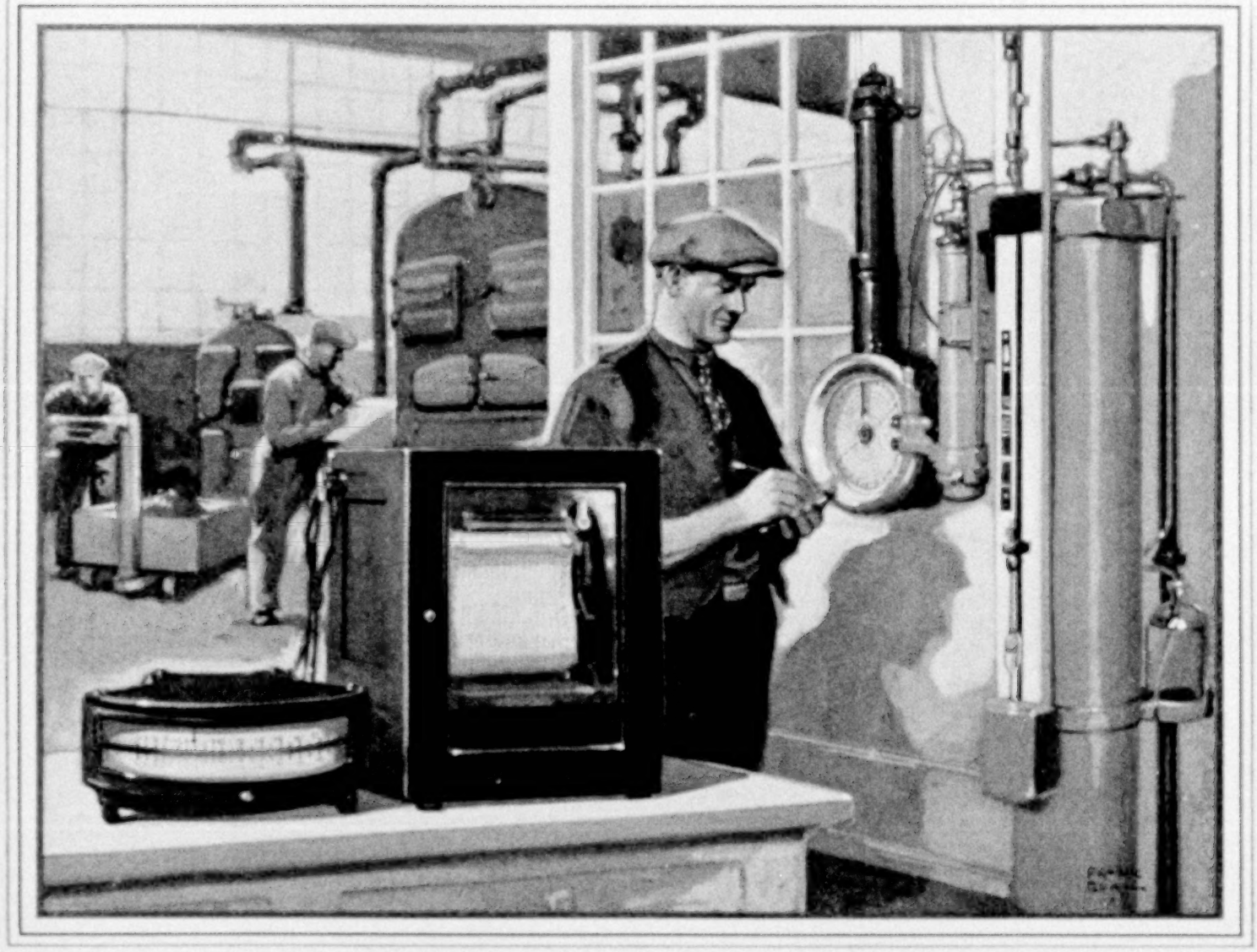
Presented to the President in Minneapolis, when President Coolidge visited that city. A handsome modern chair of solid carved walnut in the Renaissance style.

IMPORTANT—Be sure when you buy walnut furniture that at least all the exterior parts are walnut, if you would have the permanent satisfaction that walnut gives. Much furniture is made with splendid walnut panels, but with solid framework and legs of an inferior wood, and such pieces should neither be sold or bought as genuine walnut.

Permit us to send you "The Story of American Walnut," a fascinating book full of interesting and valuable information about this wood, its uses, advantages and the part it played in the development of fine furniture. It also tells how to detect imitations. Write for it.

AMERICAN WALNUT MANUFACTURERS' ASSOCIATION
Room 932, 616 S. Michigan Ave., Chicago, Illinois

XUM



For more than thirty-five years, United States engineers have tested every new principle and development in the science of heating. Working with the best of laboratory equipment, they have increasingly sought ways and means to extract more heat energy from fuel and increase the general efficiency of United States products.

As a result of this exact and painstaking experimental work, the entire line of Capitol Boilers and United States Radiators is superbly modern. No heating plants can offer greater economies or more convincing records of reliability. Any architect or heating contractor will be glad to confirm these statements from his own experience.

We shall be glad to send you an illustrated booklet which fully explains the modern idea in house heating

UNITED STATES RADIATOR CORPORATION
General Offices, Detroit, Michigan

Capitol Boilers

BRANCH AND SALES OFFICES

Boston • Springfield, Mass. • Portland, Me. • Providence, R.I. • New Haven • Troy, N.Y. • *New York • Brooklyn Harrison, N.J. • Philadelphia • Baltimore • *Buffalo • *Pittsburgh • Cleveland • Columbus • Cincinnati • Detroit Chicago (No. Side) • Chicago (So. Side) • Milwaukee • Indianapolis • Louisville • St. Paul • St. Louis • Kansas City • Des Moines • Omaha • Denver • Seattle • Portland, Ore. *Warehouse stocks carried at all points except those indicated by star.

© Brown Bros.

AT DIZZY HEIGHTS.....

he spreads a coat of red-lead

WHY?

DAILY he dangles in mid-air. The steel skeleton of a building that is to be, or a network of bridge cables, is his only foothold. Where he works, breezes become whistling gales striving to tear him from his precarious perch. Below him move many tiny dots, skeltering about like so many ants, all unaware of one of their kind who works at dizzy heights *just to spread a thin red film of lead paint.*

"Why," you ask, "must he do it?" Because upon the thoroughness with which he spreads this red film—upon its ability to protect the surface it covers—rests, in no small measure, the safety of the structure and the lives of thousands.

Protecting the strongest steel

The best protector for metal surfaces used by man today is pure red-lead paint, made from lead.

Such a red-lead is Dutch Boy red-lead, preferred by the United States Navy, eminent engineers, contractors, and builders. Spread over a steel surface, Dutch Boy red-lead seals the pores of the metal and forms a hard yet elastic protecting film that resists moisture and keeps out air. When such a film is properly maintained, it gives complete and lasting protection.

Paint booklet sent free

The "Handy Book on Painting," a storehouse of general paint facts and formulas, will be sent to anyone free. A section of this handbook is devoted to the protection of metal surfaces. It tells how to prepare the surface for painting, how to mix and how to apply the paint.

Besides red-lead, the Dutch Boy line includes flatting oil, linseed oil, solder, babbitt metals and white-lead.

If you have any questions about these products or about the many uses of lead, the wonder metal, write to our nearest branch.

NATIONAL LEAD COMPANY

New York, 111 Broadway; Boston, 131 State Street; Buffalo, 116 Oak Street; Chicago, 900 West 18th Street; Cincinnati, 659 Freeman Avenue; Cleveland, 820 West Superior Avenue; St. Louis, 722 Chestnut Street; San Francisco, 485 California Street; Pittsburgh, National Lead & Oil Co. of Pa., 316 Fourth Avenue; Philadelphia, John T. Lewis & Bros. Co., 437 Chestnut Street.

XUM

FADA Radio

Tune in tonight with Fada Radio

The Standard of Reception

IF you want to know what radio can be like at its best, 'phone your dealer for a complete demonstration of the Fada Radio in your own home tonight—without obligation to buy.

Discover for yourself tonight the range, the selectivity, the clearness of reception of Fada Radio—with volume, full or gentle, as you prefer. Dial for distance—*real* distance—tuning in the stations you want as precisely and easily as you tune out those you don't want.

Then note: Fada Service guarantees permanent performance at the same high level as the demonstration.

Call up your dealer today. It's the first step towards radio satisfaction.

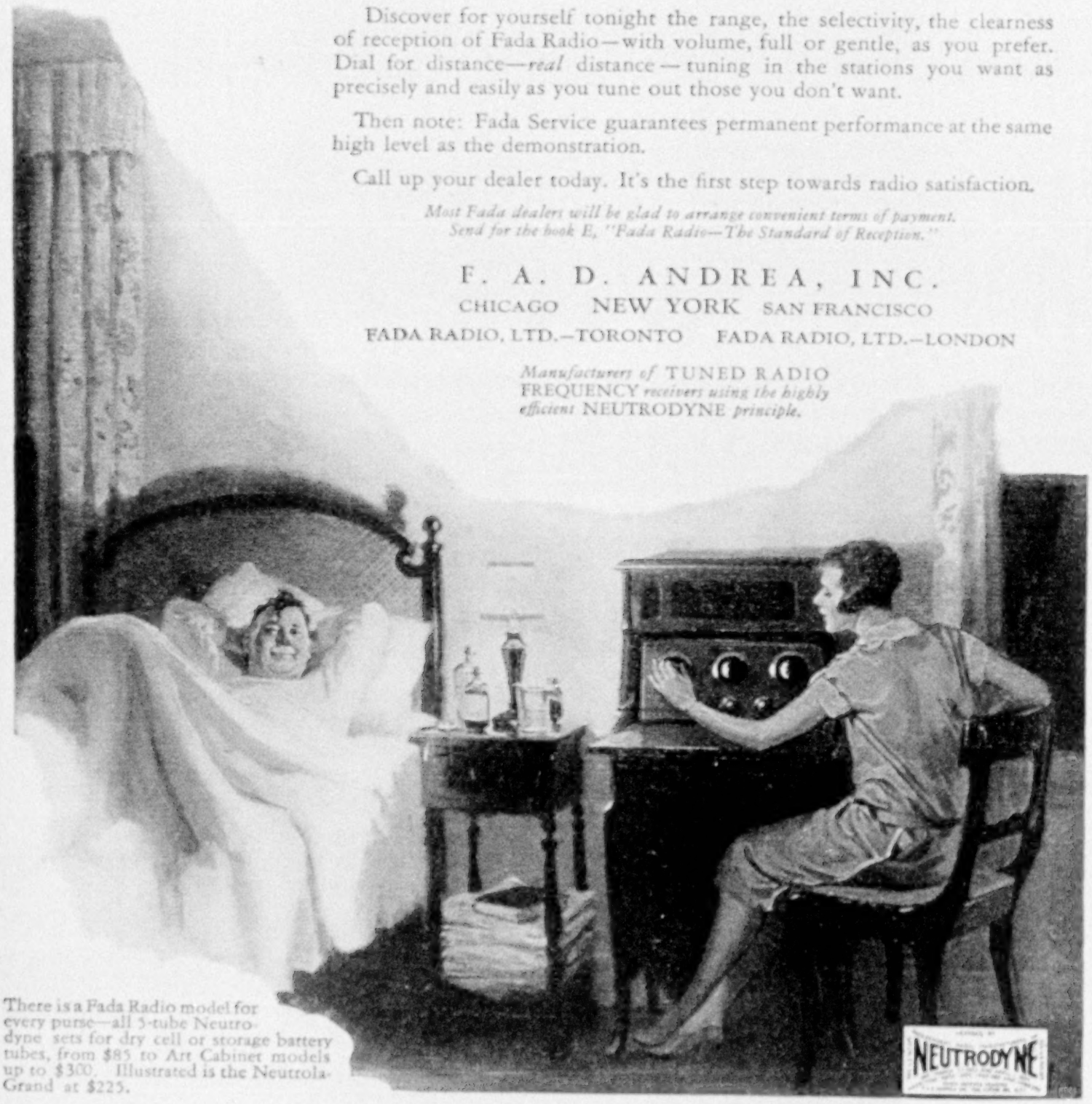
Most Fada dealers will be glad to arrange convenient terms of payment.
Send for the book E, "Fada Radio—The Standard of Reception."

F. A. D. ANDREA, INC.

CHICAGO NEW YORK SAN FRANCISCO

FADA RADIO, LTD.—TORONTO FADA RADIO, LTD.—LONDON

Manufacturers of TUNED RADIO FREQUENCY *receivers using the highly efficient* NEUTRODYNE *principle.*



There is a Fada Radio model for every purse—all 5-tube Neutrodyne sets for dry cell or storage battery tubes, from $85 to Art Cabinet models up to $300. Illustrated is the Neutrola-Grand at $225.

With a few strokes of a pen American patriots registered their Independence

A Waterman's Pen—with one filling—would have written many times the entire Declaration of Independence. It would have startled these patriots into an appreciation of its remarkable efficiency.

IN MILLIONS of homes and offices today it is freeing men and women from pen-discomfort and aiding them in "the pursuit of happiness."

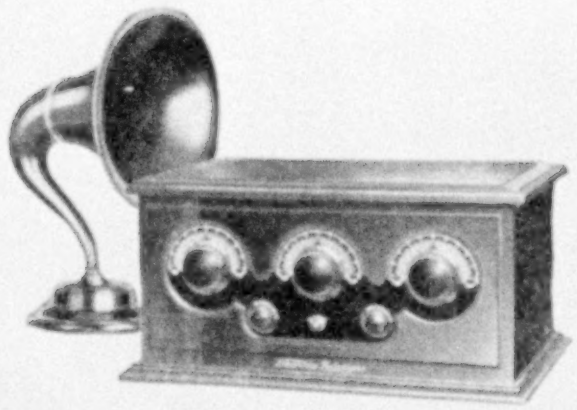
FOR THE sake of independence try a Waterman's. We recommend the model illustrated. Black, mottled or cardinal holders; fitted with pen points that write as you would write.

Illustration is exact size of $4 model

From $4 to $6.50, according to size

Sold and guaranteed by 50,000 merchants

Waterman's Ideal Fountain Pen



ANNOUNCEMENT

This is of interest to opera-goers, to lecture and symphony patrons as well as to the dancing set, and to those scientifically interested.

Artistic radio has come with Thorola Islodyne, embodying the *Isolated Power* principle made possible only by Thorola Low-Loss Doughnut Coils. They conquer "pick-up" of unwanted stations, waste of power, uncontrollable "oscillation," complicated wiring, uncertain operation. Radio experimenters know what all this means. Radio listeners no longer need to know!

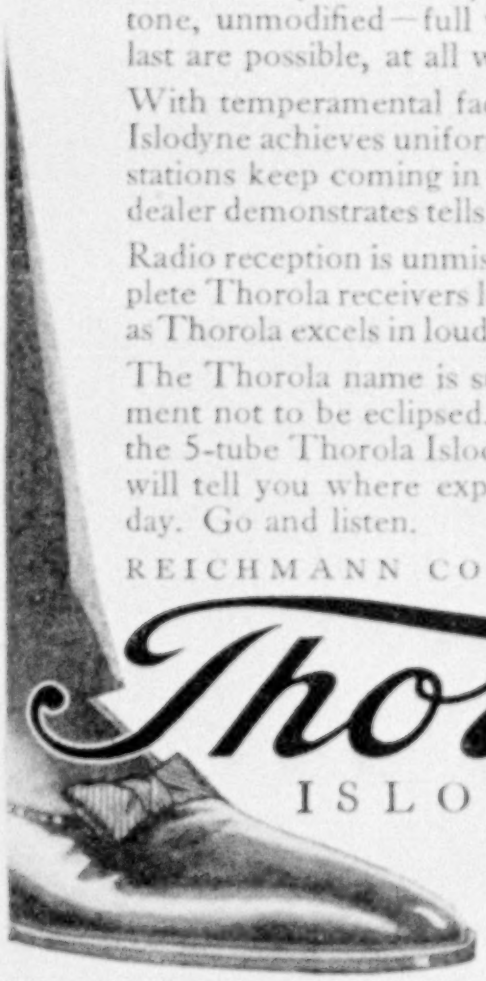
With Islodyne action any one station wanted is cleanly selected, even in broadcasting centers. Utmost power is *isolated*—*focused*—on this one set of signals only. The delicate radio impulses do not conflict, neutralize, offset each other. Full tone, unmodified—full volume, full distance at last are possible, at all wave lengths.

With temperamental factors banished, Thorola Islodyne achieves uniform reception. The same stations keep coming in the same. The set your dealer demonstrates tells what your set will do.

Radio reception is unmistakably elevated. Complete Thorola receivers lead their field by far, just as Thorola excels in loud speakers and apparatus.

The Thorola name is surety of radio development not to be eclipsed. The intense interest in the 5-tube Thorola Islodyne at every radio store will tell you where expert opinion centers today. Go and listen.

REICHMANN COMPANY, *Chicago*



Thorola

ISLODYNE

In smart Therocco Cabinet the 5-tube Thorola Islodyne is..... $85

In stunning Burled Walnut Cabinet with Circassian top the 5-tube Thorola Islodyne is..... $115

Thorola Loud Speakers with new burnished Bakelite horn and gold throat-band are even better in appearance and performance.

Thorola 4..... $25

Thorola Jr..... $15

Thorola Low-Loss Doughnut Coils installed in your present set will give you many of the greatest Thorola advantages.

Complete set (3).. $12

Per coil..... $4

Prevent this

Too tired to dance

It really doesn't seem possible, does it, that happiness can depend on the teeth? But ask your dentist or your physician. You will learn that not only happiness but often health and good looks are lost when teeth start to decay.

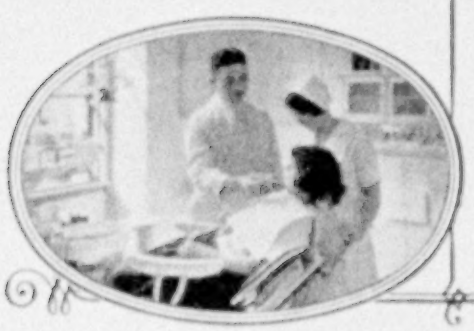
Here is a scientific experiment, told recently by John Amid in Collier's Weekly, that speaks volumes:

> "In the interests of science a bit of the streptococcus culture from one of the extracted teeth (from a human suffering from rheumatism) is injected into the blood of a rabbit. Three weeks and the rabbit is hopelessly deformed."

Preventive dentistry is sweeping the United States. Today it is fully recognized that tooth decay is a menace to the nation's health.

In schools where preventive oral hygiene has been introduced, children have shown striking advance in health and mental vigor, and increased immunity to disease.

Here is a photograph taken in the Dental Clinic of the Heckscher Foundation, New York, where the importance of preventive dentistry is fully realized.



Use Colgate's—
It *removes causes* of tooth decay

Good Teeth—Good Health—Good Times

PEOPLE who care how they look are concerned first of all with their teeth—for the mouth is the front door of personality. Not only are good teeth important to beauty; they are essential to health, to happiness, and sometimes even to life itself

Because good teeth and good health are so closely related, modern dentists are urging preventive dentistry. Its aim is to combat disease by preventing tooth troubles—to fight tooth decay before it starts. Colgate's Ribbon Dental Cream always has been in the forefront of this scientific move for better teeth and health.

Colgate's is Safe and Effective

Colgate's is a modern dentifrice—widely recommended by modern dentists. It "washes" your teeth thoroughly clean—does not scratch or scour them. The combined action of its soap and chalk gently removes clinging food particles. Causes of tooth decay thus are safely and effectively removed by Colgate's. It is safe to use for a lifetime.

Tastes Good—Does Good

Take good care of your teeth and they will take good care of you. Brush them after each meal. No matter what kind of tooth brush you like, use Colgate's with it. The taste of Colgate's is pleasant. It is made sensibly, advertised sensibly, and sold at a sensible price, 25c for a large size tube.

Consult your dentist twice a year. It pays.

COLGATE & CO.
Established 1806

Truth in Advertising Implies Honesty in Manufacture

John Roche with Warner Brothers' Productions.

Patrick DULUTH

Patrick Overcoats are Distinctive!

Because of their deft hand-tailoring, correct design and perfect fit, they have earned their place among the foremost STYLE COATS OF AMERICA.

Their outstanding feature is the beautiful Patrick Cloth. It is woven in original and exclusive patterns and gives unusually satisfying wear.

Write for samples of this wonderful Cloth—and our interesting Overcoat Style Booklet also name of nearest dealer. Address Desk G-20.

OTHER PATRICK PRODUCTS:
Sweaters and Sport Jackets—Flannel Shirts
Golf and other Hosiery—Leather Garments
Mackinaws, Blankets and Auto Robes

Our Two Brands

Three cloth weights—Heavy, Medium, Light.

Prices $25 to $85

Excellent Quality.

Superlative Quality.

F. A. PATRICK & CO. DULUTH
Makers of both Cloth and Garment

"PURE NORTHERN WOOL from sheep that thrive in the snow"

Hear Ye! Hear Ye!

LOVERS OF COFFEE

THE COFFEE PROBLEM IS SOLVED!

A CUP OF HOT WATER, ONE TEASPOONFUL OF

G. Washington's

DELICIOUS INSTANT COFFEE

SUGAR AND CREAM TO TASTE.

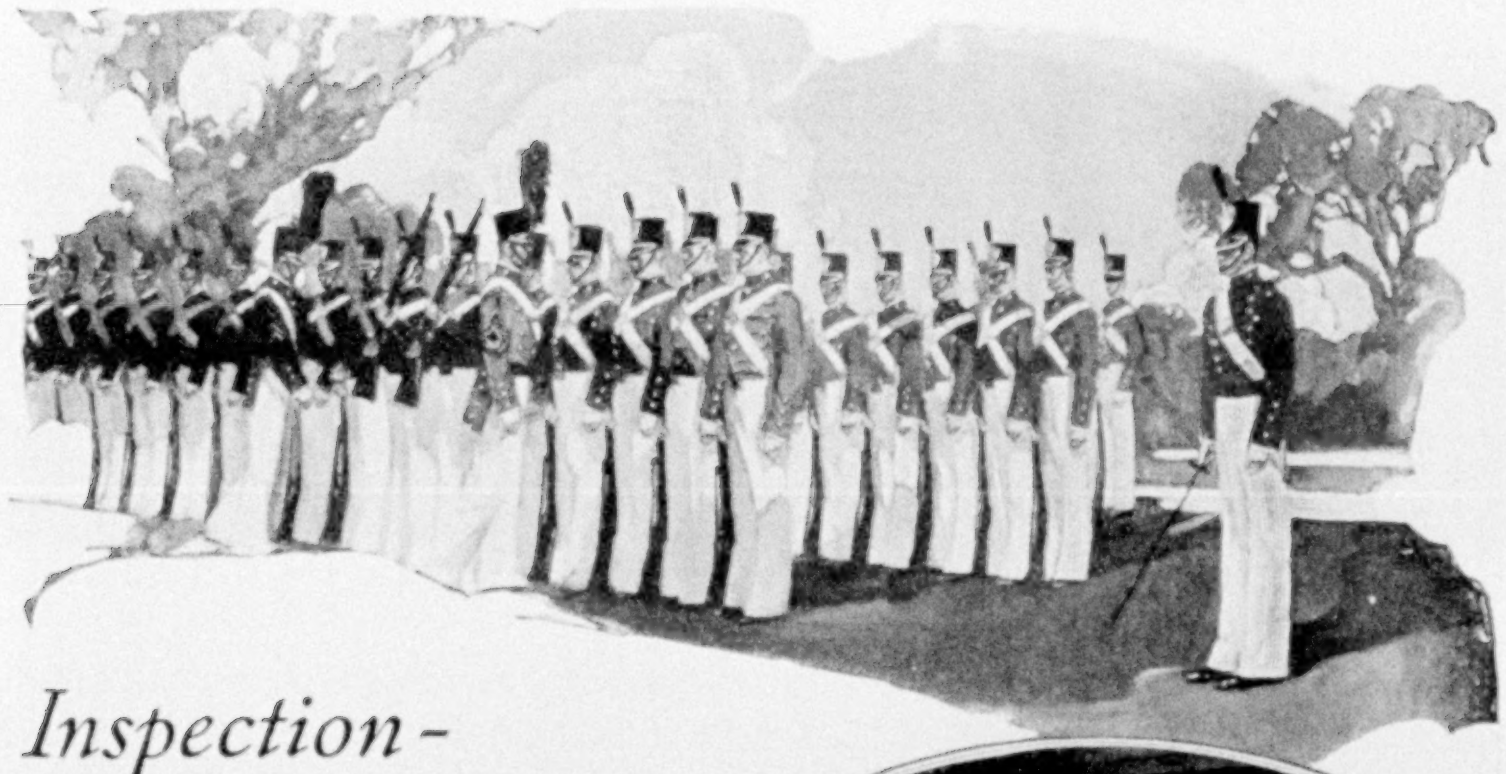
EACH CUP TO ORDER AT TIME OF SERVICE

WITHOUT TROUBLE OR FAILURE.

UNIFORM QUALITY GUARANTEED

Send 10c for Special Trial Size Recipe Booklet Free

G. WASHINGTON COFFEE REFINING CO. 76 Varick Street, New York



Inspection - Inspection - Inspection!

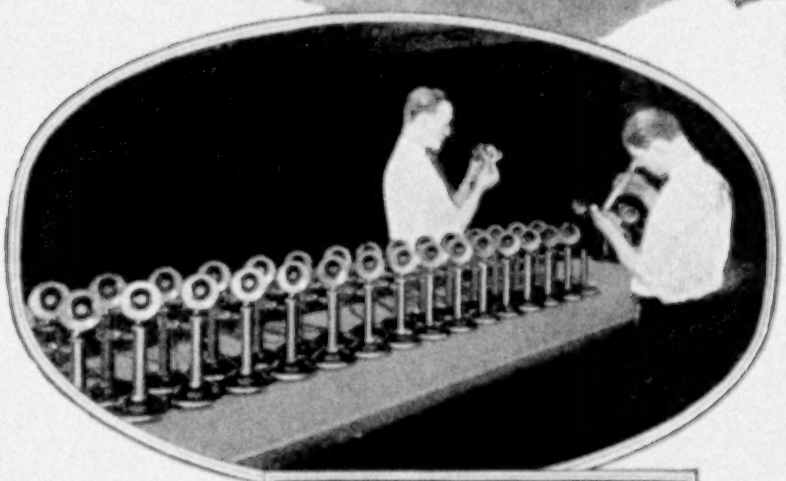
-makes good soldiers and good telephones

At West Point and Western Electric, the order of the day is the same—inspection, inspection, inspection.

A vast army of small parts must pass muster before they can assemble in telephone formation. And any part found unfit for duty is rejected.

One part must measure up to standards within a thousandth of an inch. Another must be ready to obey the command of a tiny electrical current.

Constant watchfulness is kept over all the apparatus which Western Electric makes. It starts with the careful selection of raw material. It goes through every step of the manufacture. It gives you, finally, a telephone that, like a good soldier, can serve on any front.



Telephones lined up for inspection.

Roll Call. Checking up on tone quality.

Western Electric

SINCE 1869 MAKERS OF ELECTRICAL EQUIPMENT

CORRECT JEWELRY FOR GENTLEMEN

For formal evening affairs

fashion decrees the full dress suit. It is *correct*. And, on such occasions, *correct jewelry* is as important as the dress suit. That is why so many men, when it comes to selecting their evening jewelry, choose Krementz. It is *correct*. An exclusive feature of Krementz is the easily inserted, sure-holding bodkin-clutch on the back of the studs and vest buttons.

Krementz full dress and tuxedo sets are obtainable at almost any fine store catering to the well dressed man. Each set comes in a handsome gift box without extra charge.

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2061—Links, $5.50 pair

2062—4 Vest Buttons
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Centers are smoked pearl; 14 kt. rolled white gold plate borders. Complete set $15.

Krementz
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Newark New Jersey

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Radiator Furniture

WHEN your living rooms are equipped with SLYKER Radiator Furniture, you have a sense of creature comfort that is entirely lacking without it.

The patented, concealed humidifier keeps the atmosphere normally moist night and day. Health is safe-guarded, colds, and bronchial troubles are avoided. The humidifier also prevents soiling of delicate surfaces near the radiators, and saves frequent cleaning bills.

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As a boy grows older, he ceases to fear corporal punishment. What then? If you and he slip away from each other, what's left to hold him?

The only difference between you and your boy is judgment, perspective. Both of you have the same instincts and motives. You've learned. He's got to.

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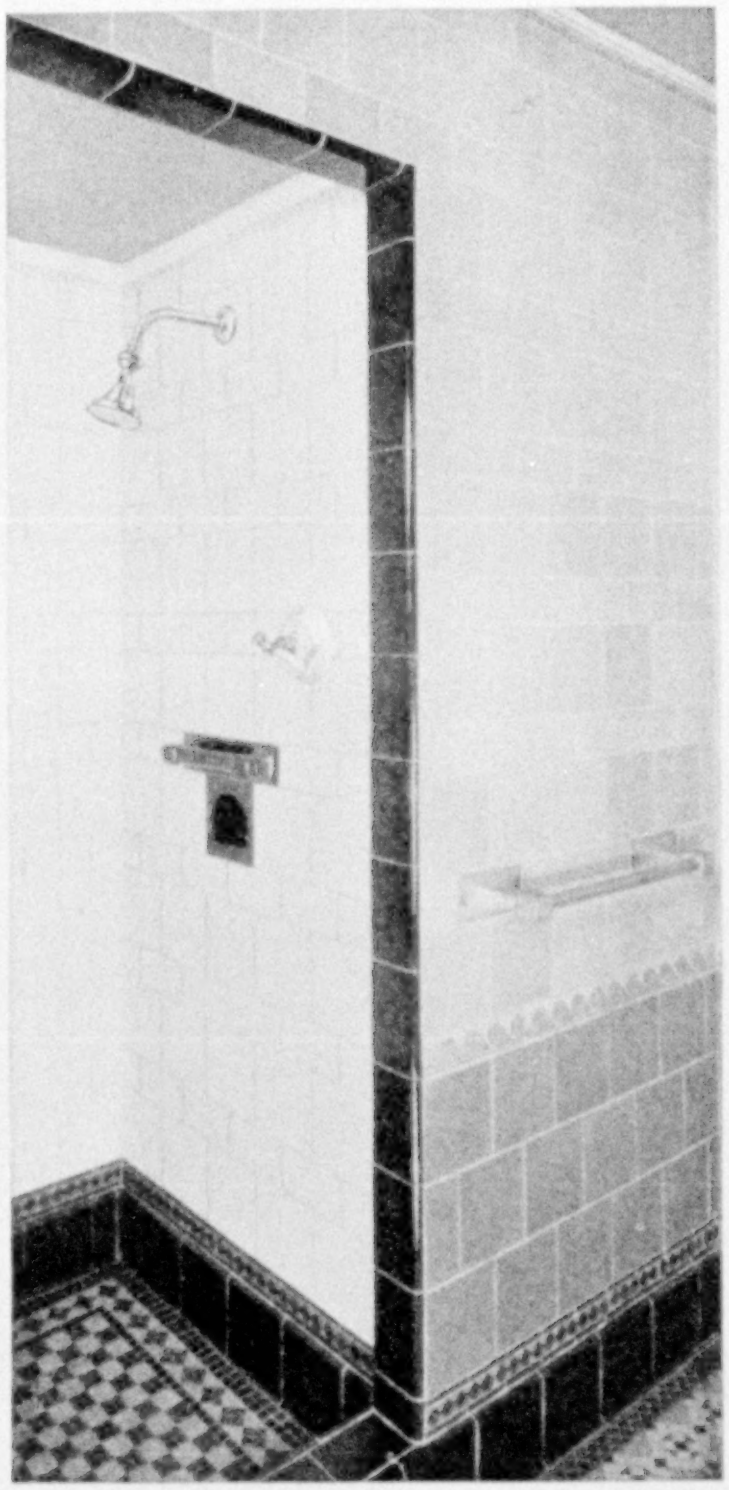

This beautiful stall, erected by the Associated Tile Manufacturers as an example of their art, is a setting for a Speakman Mixometer Shower.

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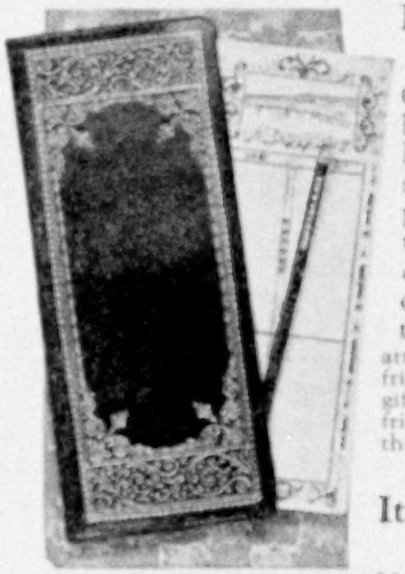

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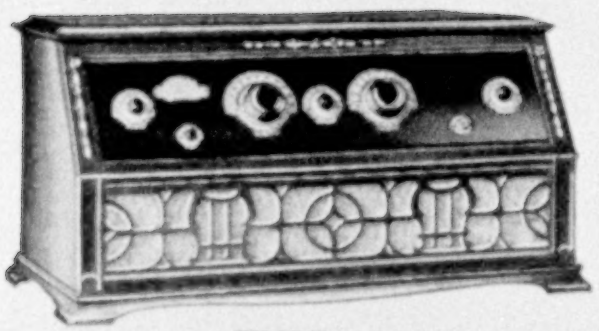
And in the evening comes Music Master filling the kindly twilight with the joyous rhythm of music - the world's universal language



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Now all your people can drink coffee to their heart's content. All who are driven to coffee substitutes can have real coffee now, and all they want. People whom coffee keeps awake can drink it at midnight and sleep.

Science has found a way to remove caffeine from coffee. That is the poison drug. Yet every coffee delight remains.

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We simply open the pores of the raw coffee bean and extract the caffeine. That is a tasteless drug. Expert tasters cannot tell when we remove it.

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Consider what that means. A delicious coffee which no doctor will forbid. No effect on the heart, nerves or kidneys, no wakefulness. No reason at all for a substitute.

If you think someone in your home would enjoy such a coffee, let us supply a ten-cup test. Mail coupon now, with a dime (or stamps).

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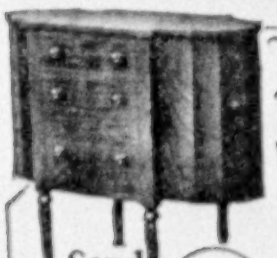

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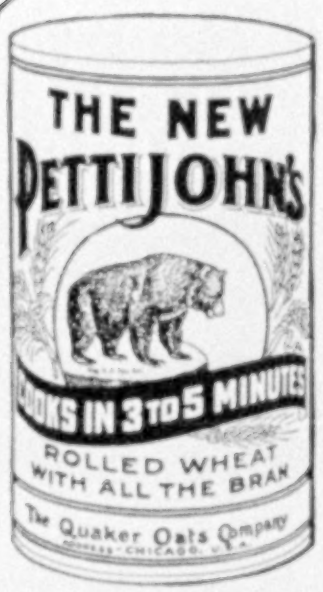


Facts to help you select a cereal food for all the family

AS the makers of the New Pettijohn's, we ask you to read these facts in the light of all you know about food—

1. The combination of milk and the whole wheat from which New Pettijohn's is made contains all the constituents which go to make up a balanced diet—energy, protein, roughage, water, mineral salts and the vitamins so essential to growth and health.
2. The combination of New Pettijohn's and milk makes an ideal food for the growing child.
3. The New Pettijohn's is easy to digest.

And finally

4. The 25% of natural wheat bran in New Pettijohn's is a very efficient laxative.

These are facts. Every one of them is proven by independent scientific authority.

Now, as you consider these facts about the scientific side of the New Pettijohn's, remember this—

The New Pettijohn's is a *delicious* food and a *natural* food. The bran in it is natural bran, just as it grows in the wheat. The family *likes* it.

Remember also, from the practical housekeeping standpoint, that the New Pettijohn's qualifies again—it cooks *through and through* in from 3 to 5 minutes.

In brief

The New Pettijohn's is a delicious whole wheat food.

It contains 25% natural bran—with essential Vitamins and Mineral Salts.

With milk it forms what dietitians call a "perfect" food.

It cooks in 3 to 5 minutes.

The New Pettijohn's

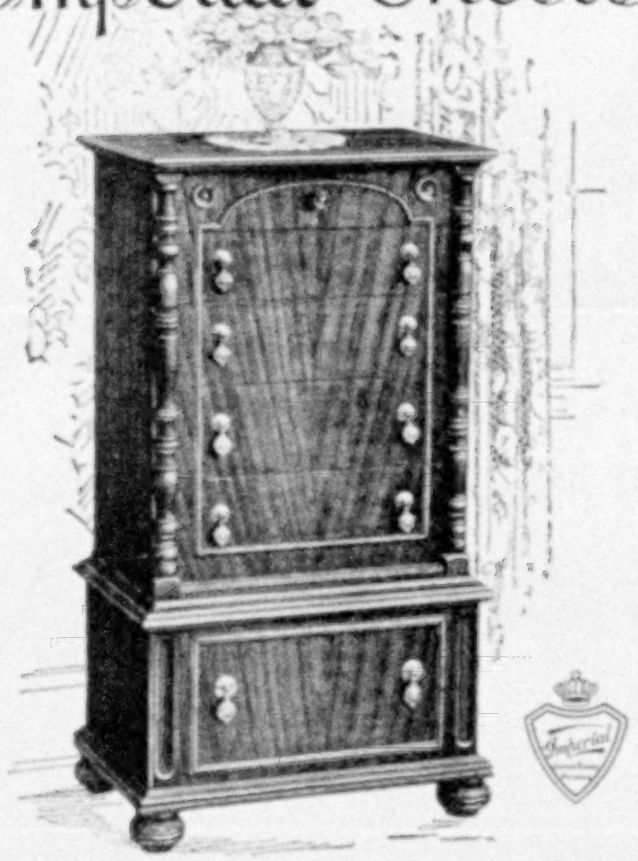
WHOLE WHEAT CEREAL

Made by

The Quaker Oats Company

CHICAGO, U.S.A.

Imperial Chests



"What a clever gift!"

said Nan. "I'd love a chest like that myself".

"Yes", agreed Sue, "no end of people admire it".

A tilting top flower stand.

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At your favorite furniture store you will see a tempting collection of original designs, rich in figured woods, lovely in colored decorations, all the handiwork of skilled Grand Rapids craftsmen.

Write Dept. G for our famous table book, free, "Heirlooms of Tomorrow".

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Now it's CARRILLE—The Newest Crane Creation

A paper that is smart, individual, and yet in perfect taste.

Letter sheets in a dainty pattern of self-tone squares with sizes and folds well out of the ordinary; some with wide blue borders.

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Crane's Carrille is a paper worthy of your personal marking, but even unmarked, Carrille will give your correspondence a smart and artistic touch, dignified by its quality and faultless taste.

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for $2.00

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Plant any time before the ground becomes frozen, and they will bloom from the middle of May to Decoration Day

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Our 1925 Fall Bulb Catalogue sent on request

Stumpp & Walter Co

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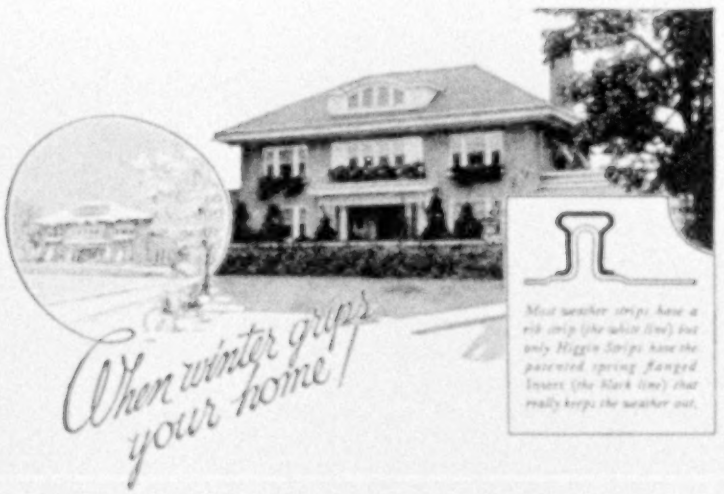

Will home be "cold as a barn" in spite of the hungry coal-eater in the cellar? Will you have rooms that "can't be heated when the wind's just so"?

Every new home should have Higgin Weather Strips installed when it is built. But Higgin fitters can install weather stripping in your present home now. They cover open windows and protect rugs and furniture with heavy canvas before they start work. Make your home winter-tight.

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Address .....

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for membership in the Society.

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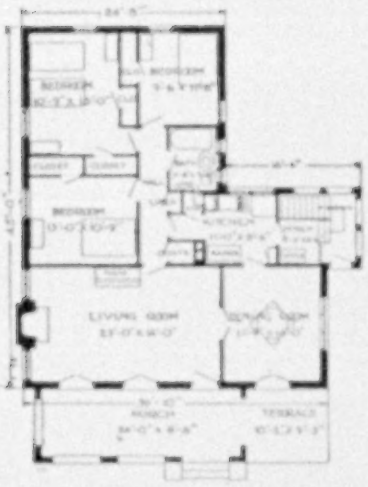
Name and Address of Nominating Member

10-25



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Quality Always Pays

BECAUSE by paying a *little* more you get *much* more. Take the Face Brick house. You pay a little more at the start, but that little comes back to you many times over in savings in repairs and painting, in slow depreciation and high resale value, in lower insurance rates and fuel costs. And all the while you have the satisfaction of living in a beautiful, comfortable home. The facts are all given in an attractive, illustrated booklet, "The Story of Brick." Send for your copy today.

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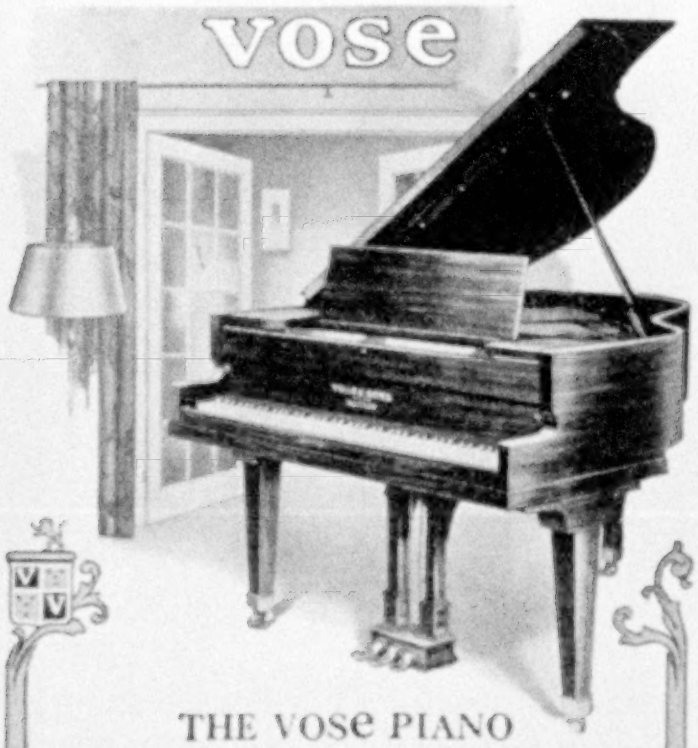

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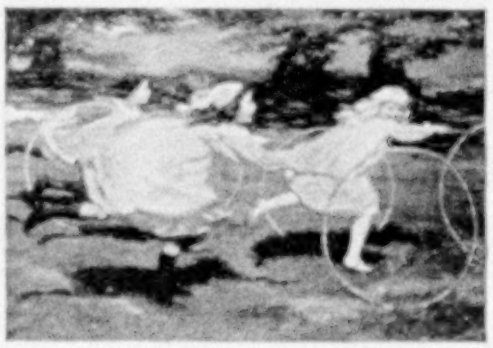

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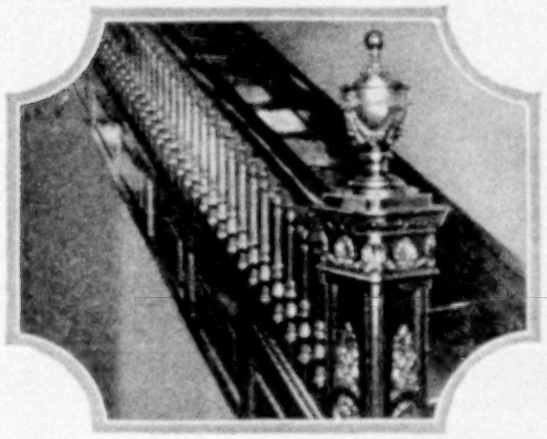
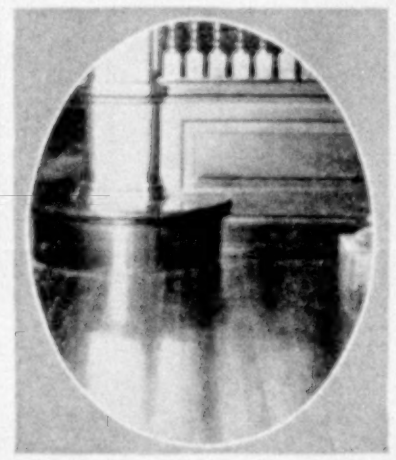
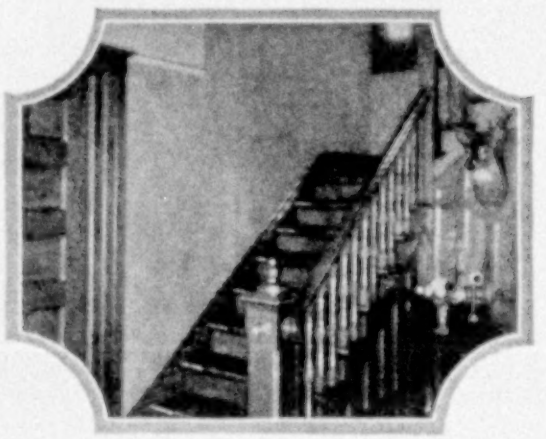


Showing the Beautiful Staircase and (Right) the Reception Hall Floor in the Lancaster, Pennsylvania, Home of John B. Oblinger —Finished 30 Years Ago





The White Oak Woodwork in the Flint, Michigan, Home of William Goodes Is in Perfect Condition after 27 Years of Service. "Liquid Granite is More than Waterproof—It Wears."

Varnished 30 years ago ... *Beautiful Today!*

WHEN a gallon of varnish is worth $50 and can be bought for $5, the fact is worth knowing.

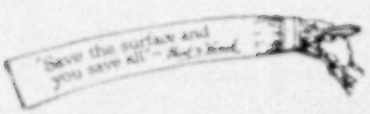
Read This—

In 1895 John B. Oblinger, of Lancaster, Pennsylvania, built the finest residence in town. His architect selected magnificent specimens of walnut, mahogany, hazel, cherry and white oak for the interior trim. It was varnished with Berry Brothers' Luxeberry Wood Finish, the original Hard Oil, and rubbed.

Today there are few homes in America that have more beautiful woodwork than this one. In 30 years it has not been touched with a varnish brush. The finish is as perfect as it was in the days before the Spanish-American War.

The floors in this house were finished with Liquid Granite Floor Varnish. Some of them have been refinished in recent years. But the floor in the reception hall, as pictured above, has never been re-varnished and is in beautiful condition today!

Mr. Oblinger's experience with Berry Brothers' varnishes is neither unusual nor exceptional. There are thousands of home, apartment and building owners in all parts of the world who pay the price for Berry quality in order to save the tremendous accumulative expense of frequent refinishing.



Here Is Another Example—

William Goodes, of Flint, Michigan, built his home in 1898 and finished the white oak woodwork with Liquid Granite. A view of the staircase is pictured above at the right. It shows the original varnish. Even the stair steps have never been refinished. Not a single hairline crack can be found anywhere. The finish is as beautiful today as when the painters completed their work 27 years ago!

Mr. Goodes writes: "Your advertisement, which says, 'Liquid Granite is more than waterproof—it wears!' is certainly true!"

Figure it out for yourself. If Luxeberry Wood Finish and Liquid Granite give such service as this, you cannot afford to employ substitutes that sell for the same price or less.

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Varnishes Enamels Stains

Detroit, Mich. Walkerville, Ont.

Lovely teeth shining white

But what would the X-ray reveal?

THIS X-ray shows tooth socket destruction by pyorrhea

BEAUTIFUL white teeth, free from decay, are not safe unless the gums are healthy. If pyorrhea attacks your gums, an X-ray would reveal how quickly the infection spreads to the root sockets which hold the teeth in place. If pyorrhea is not checked, your teeth fall out—or must be pulled—because their support is gone.

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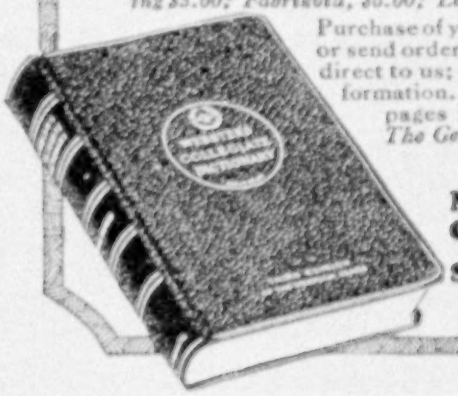

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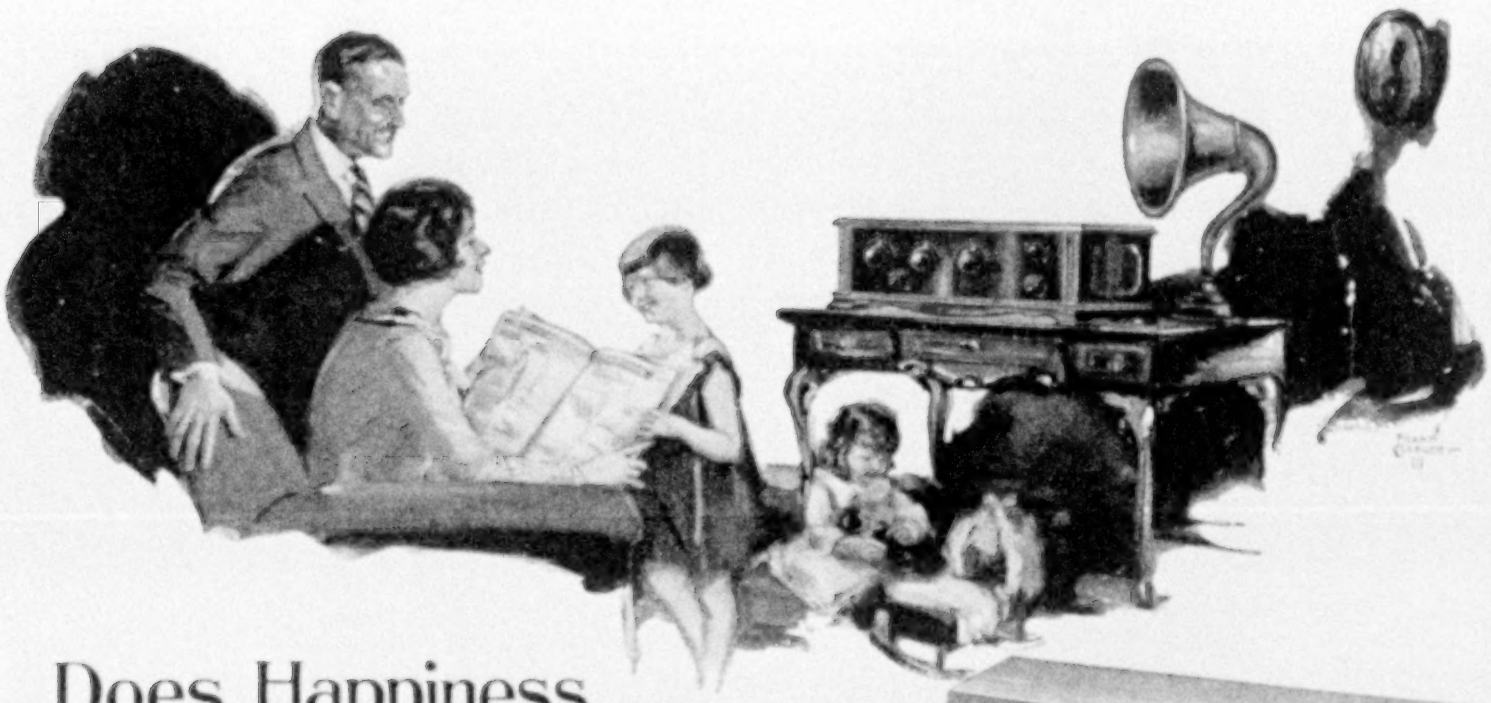

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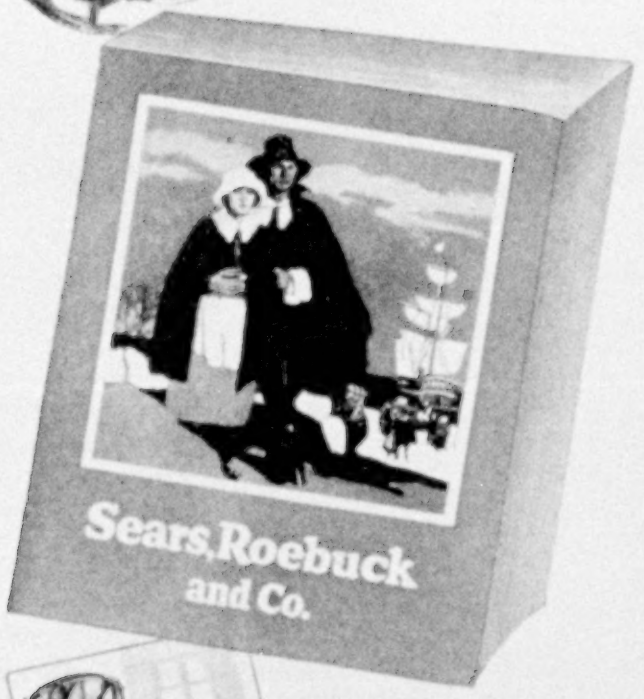

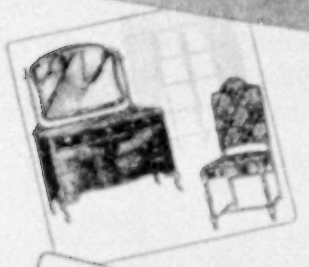

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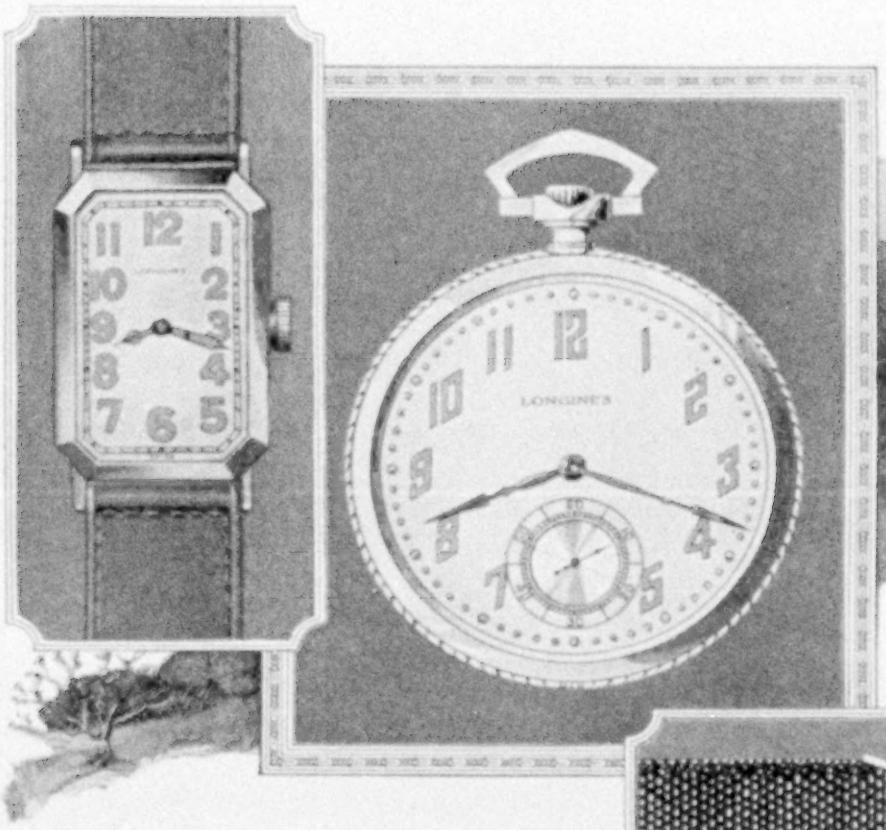

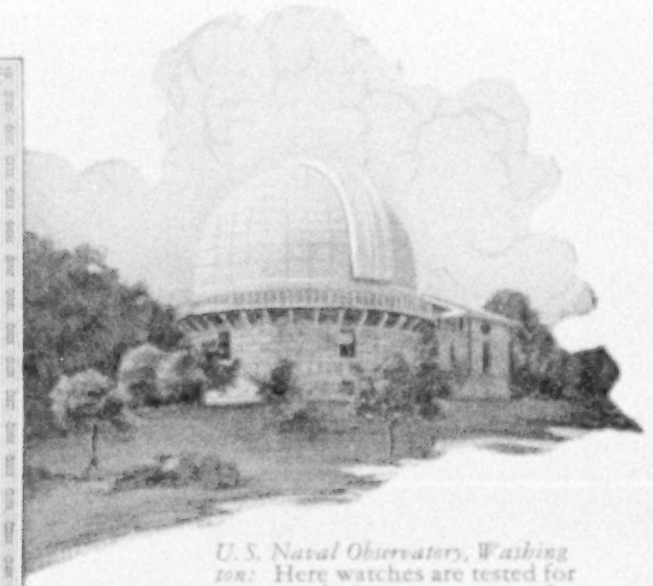

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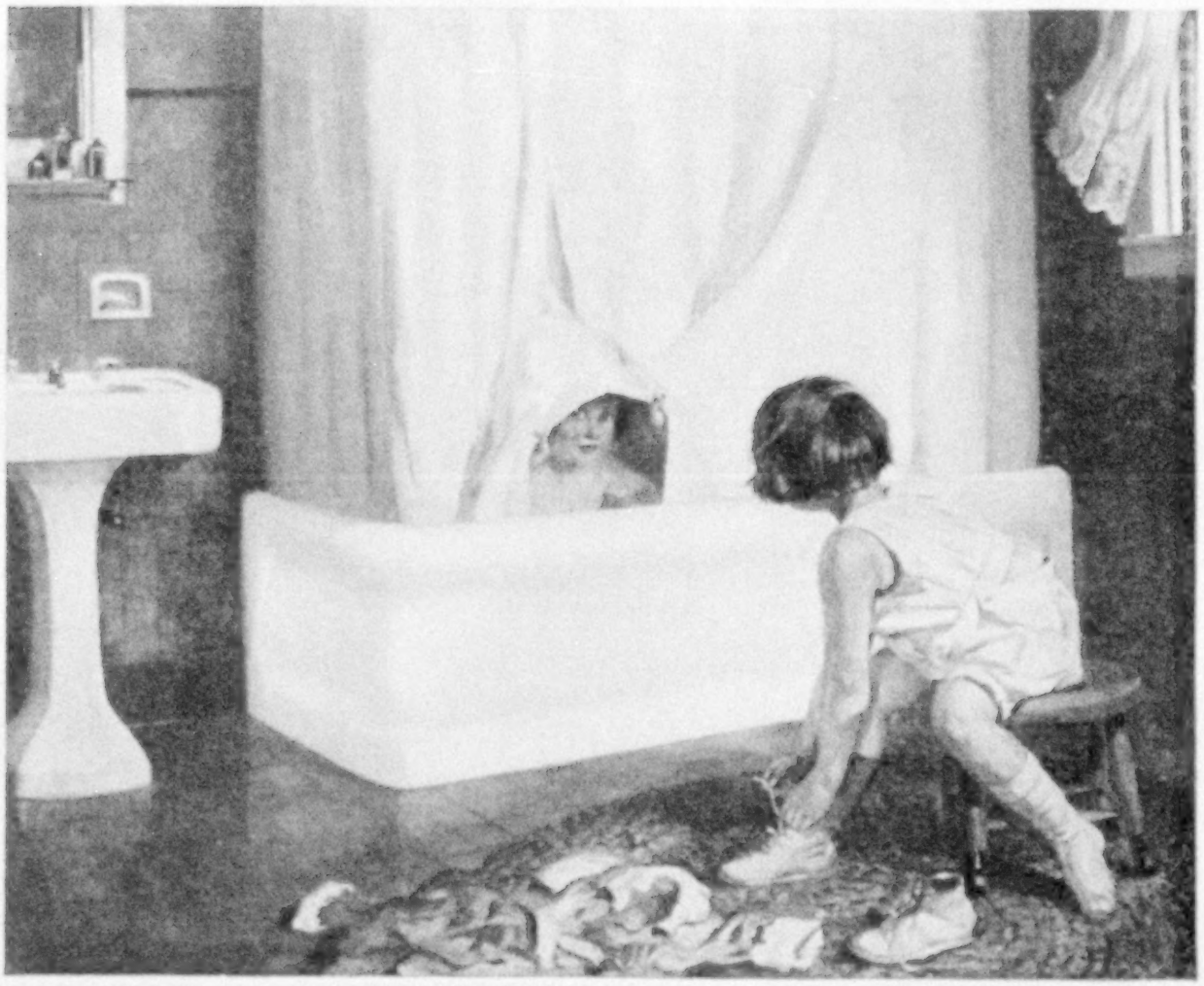

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